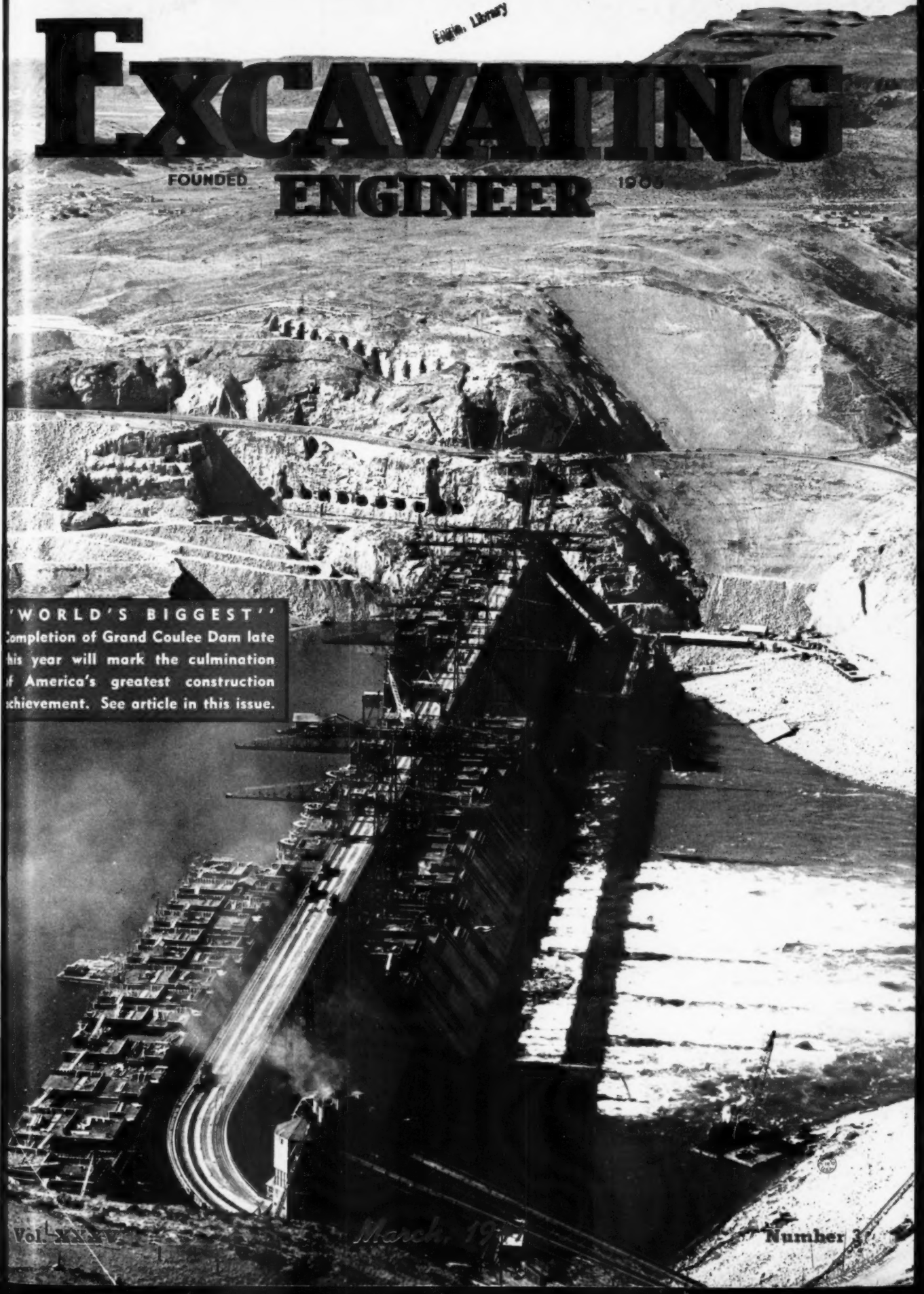
Engin. Library

EXCAVATING ENGINEER

FOUNDED 1906



"WORLD'S BIGGEST"
Completion of Grand Coulee Dam late this year will mark the culmination of America's greatest construction achievement. See article in this issue.

Vol. XXXV March 19[illegible] Number 3

MODERNIZE and Make More Money

Your old blast hole drills may still be good for a number of years of service, but still it might be much more economical to replace them with a smaller number of more efficient modern Bucyrus-Erie machines.

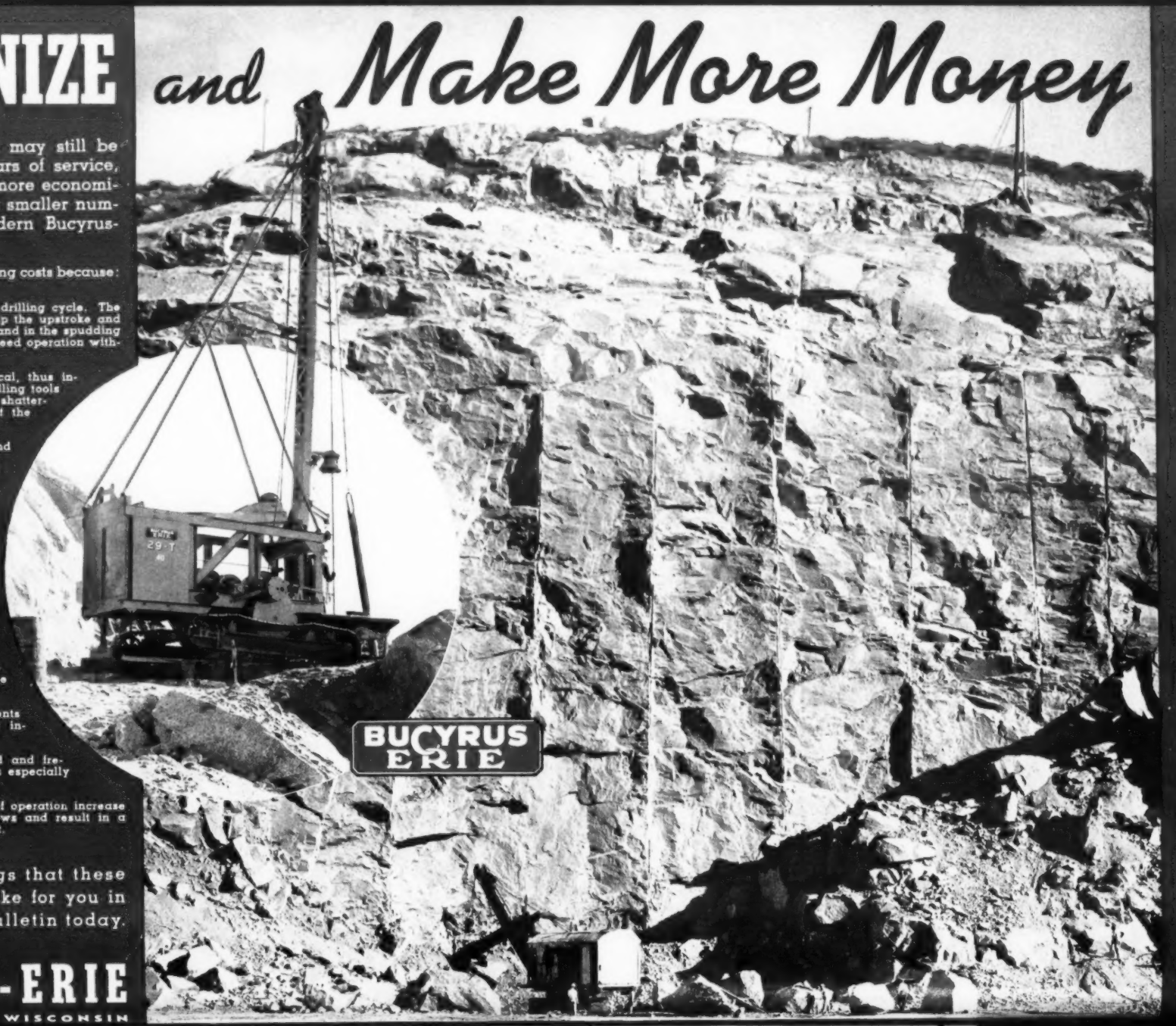
These new machines reduce drilling costs because:

1. They increase the speed of the drilling cycle. The rubber shock absorbers speed up the upstroke and cushioning at the crown sheave and in the spudding sheaves permits steadier high speed operation without damage to the machine.
2. Use of longer strokes is practical, thus increasing the momentum of the falling tools and giving you more force for shattering the strata at the bottom of the hole.
3. The quick pull-away at the end of the stroke results in a snappy, more shattering blow and more rapid penetration. Vibrations set up in the rock are accelerated and intensified because of the "undampened" action.
4. The increased capacity for heavier tools in larger holes increases the speed of drilling; the larger capacity for explosives, without need for springing, makes it possible to space holes farther apart without decreasing the effectiveness of fragmentation.
5. Time for moves, set-ups, and tool changes is materially reduced, largely increasing the effective drilling time.
6. Delays for repairs and adjustments are largely eliminated further increasing drilling time.
7. Maintenance costs are reduced and frequency of cable replacement is especially low.
8. Ease, convenience and safety of operation increase the efficiency of your drill crews and result in a material saving in drilling cost.

Investigate the savings that these improved drills can make for you in your pit. Send for a bulletin today.

BUCYRUS-ERIE

SOUTH MILWAUKEE, WISCONSIN



BUCYRUS-ERIE

SOUTH MILWAUKEE, WISCONSIN

SOUTH MILWAUKEE, WISCONSIN

EXCAVATING ENGINEER

FOUNDED 1905

contents

Vol. XXXV **March, 1941** No. 3

March Advertisers

Allis-Chalmers Manufacturing Company 185
American Chain & Cable Company .....3rd Cover
Atlas Imperial Diesel Engine Company 144
Bethlehem Steel Corporation .. 165
Brooks Equipment and Manufacturing Company 173
Buckeye Traction Ditcher Co. 145, 163
Bucyrus-Erie Company ...2nd Cover 141, 157, 174-175, 180, 182, 186
Bucyrus-Monighan Company .. 192
Caterpillar Tractor Company... 138
Ensign-Bickford Company, The. 177
For Sale (Classified) 190-191
Gatke Corporation 188
General Electric 140
Haiss Manufacturing Company, George 178
Hayward Company, The 186
Hercules Powder Company 179
Hercules Steel Products Corporation 176
Homelite Corporation 178
Ingersoll-Rand Company 137
International Harvester Co. ... 181
Koehring Company 169
Leschen & Sons Rope Co., A. .. 183
Lincoln, Hotel 186
Macwhyte Company 161
Northwest Engineering Company 143
Onan & Sons, D. W. 189
Owen Bucket Company 189
Positions Wanted (Classified). 189
Rogers Brothers Corporation .. 186
Sanford-Day Iron Works 142
Sauerman Brothers 173
Socony-Vacuum Oil Company, Inc. 170-171
Standard Oil Company of California .....4th Cover
Templeton, Kenly & Co. 180
Wellman Engineering Co., The 167

"World's Biggest" — By Karl Stoffel **147**

BIG is the word for Grand Coulee Dam. Excavating Engineer presents a general review of the inspired construction and planning methods that made this great structure possible.

Gaviota Service Institution — By Floyd Suter Bixby **150**

Residents of Graviota Peninsula, California, are given "all around" service by Contractor J. J. Hergert, who changes the local topography on order.

Wilbur Cross Parkway Job — By Spencer Jones **154**

Short on mileage, but long on yardage, D. Arrigoni's 1½-mile Connecticut highway job called for wide, deep cuts and high fills that involved the handling of 500,000 cubic yards.

Editorials **158**

Review of 1940 Construction 158
Dangerous Playthings! 159
Highway Tax Collection vs. Road Expenditures 159

Equipment You Ought to Know About **160**

Portable Asphalt Plant 160
Motor Grader 160
LeTourneau Carryall 160
No. 23 Paving Breaker 160

Shots from the Firing Line **168**

ARBA Convention 168
Penn Turnpike Extension Shelved 168
Speed Panama Canal Work 168
Maine, New Hampshire Bridge 168
N. Y. to Complete Lincoln Tunnel 173
AGCA Convention 176
IRBA Stresses Illinois Road Needs 176
Divide $40,000,000 Airport Program 182
Whitney Dam Near Completion 182
Another Section of Contra Costa Let 183
Bulldozers Help Repair an Aqueduct 183

Obituaries **172**

Mitchell Davis Follansbee
Charles Sidney Porter

Not in the Contract **184**

Notes from the Manufacturers **188**

New Trade Literature **189**

Published Monthly by THE EXCAVATING ENGINEER PUBLISHING COMPANY, South Milwaukee, Wisconsin, U.S.A.

F. O. WYSE, *Manager* — ARNOLD ANDREWS, *Assistant Manager*
D. B. REED, JR., *Editor* — M. J. BARGENQUEST, *Associate Editor*
JOHN L. MORAVEC, *Art Director* — DELMAR COHEN, *Assistant Editor*
E. M. HEUSTON, *Sales Manager* — E. F. BRIESEMEISTER, *Assistant Editor*

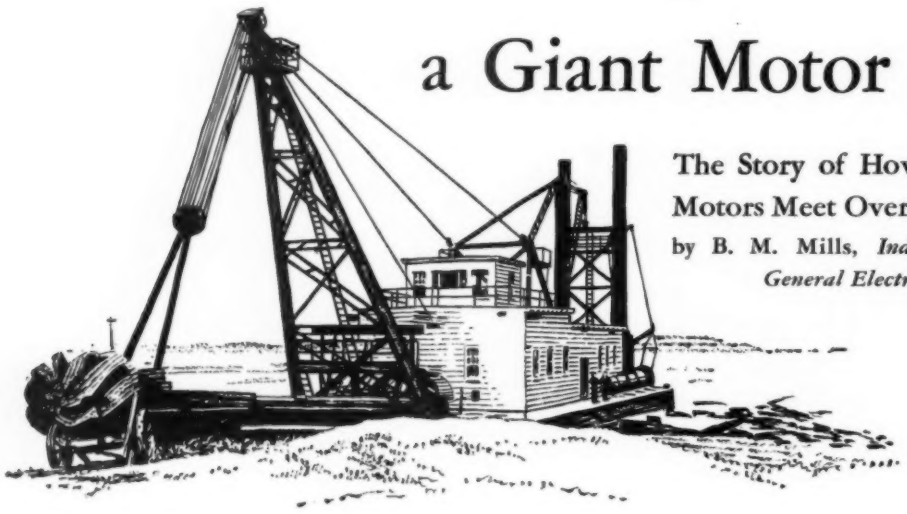
CCA Member Controlled Circulation Audit

Regular subscription: 25 cents per copy, $2.50 a year; Canada, subject to publication policy, $3.50 per year. Special subscription: Upon application on card inserted in this number this publication will be sent frequently (not regularly) free of charge, to companies, executives and supervisors engaged actively in the industry of excavation.

COPYRIGHT 1941 BY THE EXCAVATING ENGINEER PUBLISHING COMPANY

SOUTH MILWAUKEE, WISCONSIN

The *Extra Lung* that Keeps a Giant Motor Healthy



The Story of How Dredge-pump Motors Meet Overload Conditions

by B. M. Mills, *Industrial Department, General Electric Company*

THE problem of getting an electric motor that can power the main pump of a hydraulic dredge dependably and economically under all conditions is one of the severest facing general contractors. Unless a dredge motor is properly designed, it will grow old long before its time because of the large amount of overload service it must perform.

To cope with this situation General Electric engineers have designed a motor to which an extra "lung"—a suction blower—is easily added when the motor is greatly overloaded. This design simplifies the change-over to forced ventilation in order to increase the air circulation around the motor, and reduces maintenance expense.

For the Tough Jobs

It would be easy to supply a satisfactory motor if the pump and impellor characteristics, digging conditions, and heads were all known and fairly constant. But contractors often have jobs where a dredge must maintain yardage against an additional 1,000 feet or so of line, a few more feet of lift, or to produce additional yardage at low heads. Failure to overcome these obstacles easily often means the difference between a heavy loss and a good profit on a job.

If the motors are not properly designed to handle overloads under the usual unfavorable dredge conditions, there may be many bad results. Overheating of the insulation and overloading of the brushes, collector rings, and bearings shorten the life of these parts and contribute to excessive maintenance, expensive shutdowns, and lost yardage.

One method of solving this problem of extreme overloads is to install a greatly oversized motor. But this causes unnecessarily high first cost of the drive. It may increase the hull size of the dredge and handicap it in maneuvering. And such a motor uses too much power under moderate digging conditions when it is running underloaded at reduced efficiency and power factor.

B. M. MILLS

Affords Several Advantages

Our heavy-duty dredge-pump motor, designed for high-maximum running torque, handles overloads more economically. The stator frame is so arranged that, with no modifications except a negligible change in the cover plates, a suction blower can be added. This supplies the extra cooling air needed to prevent injurious heating and thus increases the permissible output of the motor by at least 30 per cent.

There are other features in this motor which help minimize maintenance expense, and increase yardage by preventing unnecessary shutdowns, but which don't materially increase the weight of the drive. These include oversize collector rings, extra brush current capacity, oversize shafts and bearings, and extra-sturdy fabricated-steel stator frames and rotor spiders. The motors are also specially insulated to protect against excessive moisture, winter shutdown, dirt, and other unfavorable conditions.

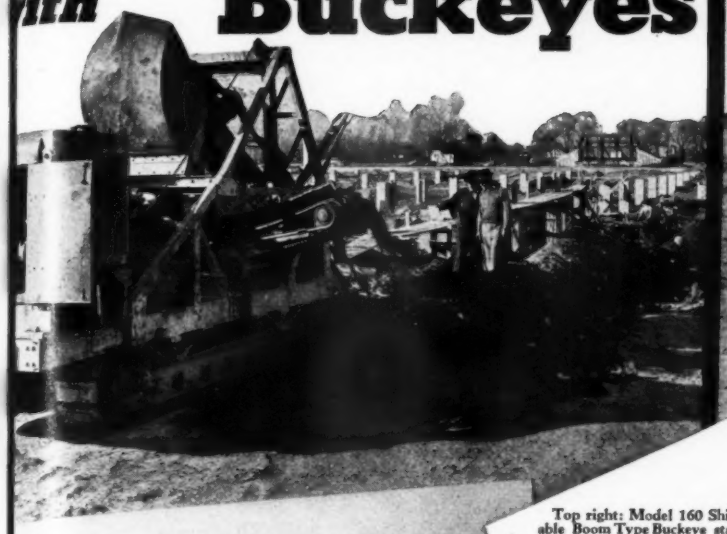
This simple solution of a common problem is another contribution by General Electric engineers to electrical progress in the construction industry. If you have any electrical engineering problems on your jobs, we'd like the opportunity to help you solve them. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

665-13

For your convenience in writing to General Electric, you will find a card bound in this issue.

Stay in the Profit Groove with Buckeyes

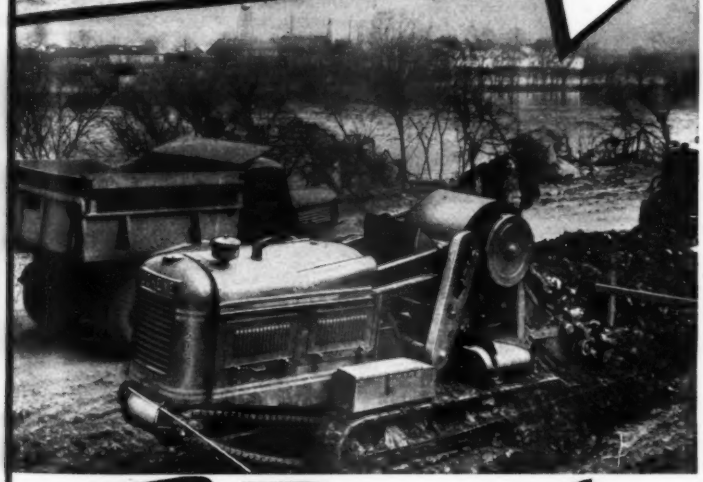


Top right: Model 160 Shiftable Boom Type Buckeye stays in the profit groove for Wells Construction Co. on a Calgary, Canada, rush airport drainage job.

Top left: 16 year old Model 140 Buckeye owned by Achille Scully, Contractor, still digs at a sweet profit on a Chicago sewer job.

Below: New, fast, compact Model 410 Boom Type Trencher keeps ahead of schedule on a sewer pipe job, making a nice profit on a low bid for this Ohio contractor.

Center: Compact truck-mounted Wheel Type Model 16-S makes a pay streak for this mid-west contractor on suburban water pipe job.



There's
buried treasure
laid out in a long line
where trenching's to be done
and the fastest, surest method to get it out for yourself is with a Buckeye Trencher — it's being done every day. There's a Buckeye for every trenching job—boom and wheel types in sizes and capacities to meet every requirement. Buckeyes are the oldest, broadest and most extensively used line—your guarantee of satisfaction in the machine you buy. Send for new bulletins.

BUCKEYE TRACTION DITCHER COMPANY
FINDLAY, OHIO

Built by Buckeye

See other cost-cutting Buckeye Equipment on Page 163

Convertible Shovels

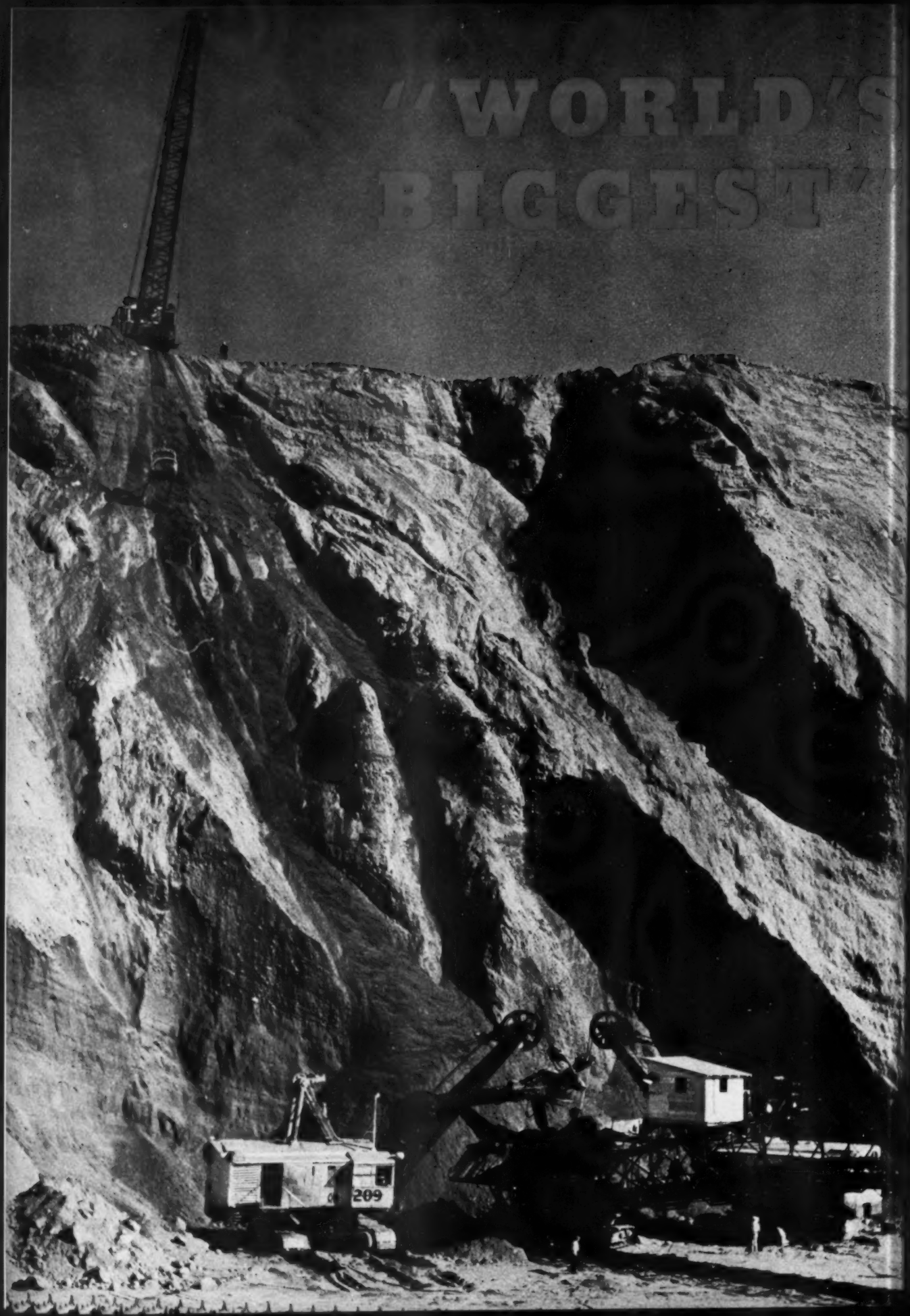
Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders


"WORLD'S
BIGGEST"
209

BIG is the word for Grand Coulee Dam. Excavating Engineer presents a general review of the inspired construction and planning methods that made this great structure possible

By KARL STOFFEL

Editor's Note: Although written from the general "slant" of a newspaper man, we are sure readers will enjoy this graphic description of Grand Coulee by Karl Stoffel, Washington newspaper man who "has had a ring side seat for the Grand Coulee job ever since the jack rabbits first scuttled off into the sagebrush when the first shovelful of alkali dust was turned over."

WHEN YOU STAND on the rim of the valley above, Grand Coulee Dam doesn't look so very big. It doesn't look big because nature created its surroundings on such an enormous scale. The rugged mountain background, the deep, swift river, the gigantic gorge from which you have just emerged . . . all these blend into a vastness that tends to dwarf the almost completed blockade of steel and concrete between the granite cliffs.

Then, going down into the valley of noise and seeming confusion, the concrete slab across the Columbia River assumes monstrous proportions. Here, you are likely to get in the same position as the man in the proverb who couldn't see the forest for the trees.

You can look through binoculars provided for tourists and see individual parts of the huge structure, and you can go into one of the government vista houses and see a scale model while an announcer tells you astronomical figured stories. But the immensity of this thing does not assimilate quickly.

World's biggest . . . world's longest . . . world's fastest . . . the records roll off without end. You are alternately unbelieving, bewildered, awed and astonished. You can't take all the facts and figures and amazing accomplishments in one big bite and expect to digest them.

But suppose you take some of the big and unusual things individually, any one of dozens which would cause open-mouthed wonder aside from this job. Only in that manner will you understand why it has been termed the eighth wonder of the world. Only then will you know how amazingly BIG it really is.

To Be Completed This Year

Grand Coulee Dam is a combination irrigation and hydro-electric project being built by the Reclamation Bureau on the Columbia River in central Washington. Construction was started in 1933 and is to be completed months ahead of schedule in the latter part of this year. Irrigation of a million and a half acres of fertile desert land is to take place gradually over an estimated half century, unit by unit.

The dam itself is the largest ever conceived. It will be 4,300 feet long, 500 feet wide at the base, 30 feet at the top and will rise 550 feet above bedrock. In engineering scope it outranks the Panama Canal, and for sheer bulk is three times as large as the famed Gizeh Pyramid of Egypt, hitherto the biggest thing ever built by man.

Money for construction is appropriated by congress and is alloted each year. Cost of the entire project, including dam and irrigation is $400,000,000, to be repaid by sale of power and reclamation. Dam building was divided into two steps, each constituting virtually a complete dam. Construction contracts were so large that some of the largest contracting firms in America had to pool their resources to meet requirements.

Initial work was done by the Mason-Walsh-Atkinson and Kier Company, otherwise known as MWAK. Their job was to clear the river bed of 18 million cubic yards

• Sand and gravel sorted in the screening plant, rides to the mixer on this "rubber railroad." The conveyor belt, nearly two miles long, operates on its own gravity power.

• Opposite page: Aggregate for Grand Coulee concrete is taken out of a 100 acre pit and moved by conveyor belt to the screening plant. Here two Bucyrus-Erie 7-yard shovels feed the conveyor hopper with material loosened by a Marion dragline equipped with a bottomless bucket.

of sand, gravel, clay and boulders, remove a million yards of rock from the dam site and pour concrete for a foundation. This foundation dam contained about six million yards, more concrete than went into Boulder Dam.

Second phase of Grand Coulee was undertaken by Consolidated Builders Incorporated, a combination of MWAK and of the Six Companies who had built Boulder Dam. This new company, known as CBI, had been on the job for the last three years.

Many words have already been written about the amazing excavation accomplished by MWAK in early years of Grand Coulee work; how a many-tenacled rubber belt conveyor system was designed to remove overburden at the unprecedented rate of 50,000 cubic yards daily; how electric shovels, a fleet of bulldozer tractors and trucks worked night and day to feed this endless carrying belt; how the total overburden removed created such a weight a mile from the dam site that it caused the earth on an entire mountain side to slip toward the river floor; and how, by building the world's largest cofferdams, engineers were able to literally juggle the huge river out of its channel and move it from side to side in the valley as they desired.

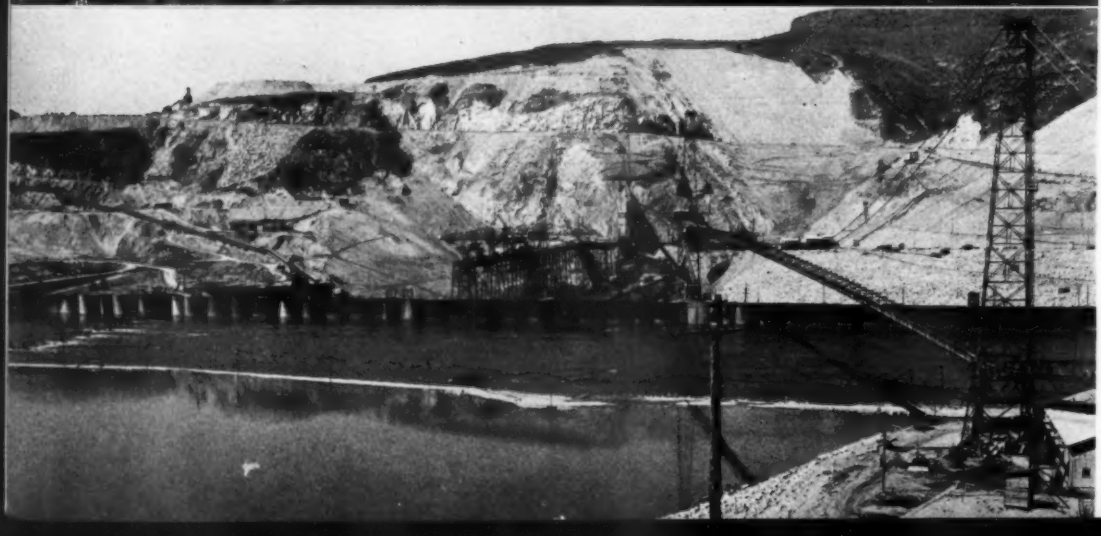
But since that time, even more dramatic goings on have been recorded on Bureau of Reclamation work sheets. Science and speed have gone hand in hand here to establish such records that engineers predict they will stand for a hundred years.

When CBI picked up the building reins in the spring of 1938, the foundation dam was 270 feet high. The new contract was to build it to its 570 foot maximum.

Original contractors had the dam site to make ready and a mountain of dirt to move but the new contractors were chiefly concerned with pouring concrete. At this writing, that job has been practically completed.

In establishing its own records, MWAK had set up twin concrete mixing plants, one on either side of the river. At the peak of their performance they poured 16,000 yards of concrete in a 24 hour day, a world's record. The new contractors combined the two mixing plants into a siamese-twin unit, and through this combination increased the capacity. They made improvements and combined other time saving equipment on all parts of the project by taking advantage of the experience and working charts of the first comers. And then they started pouring the grey mud.

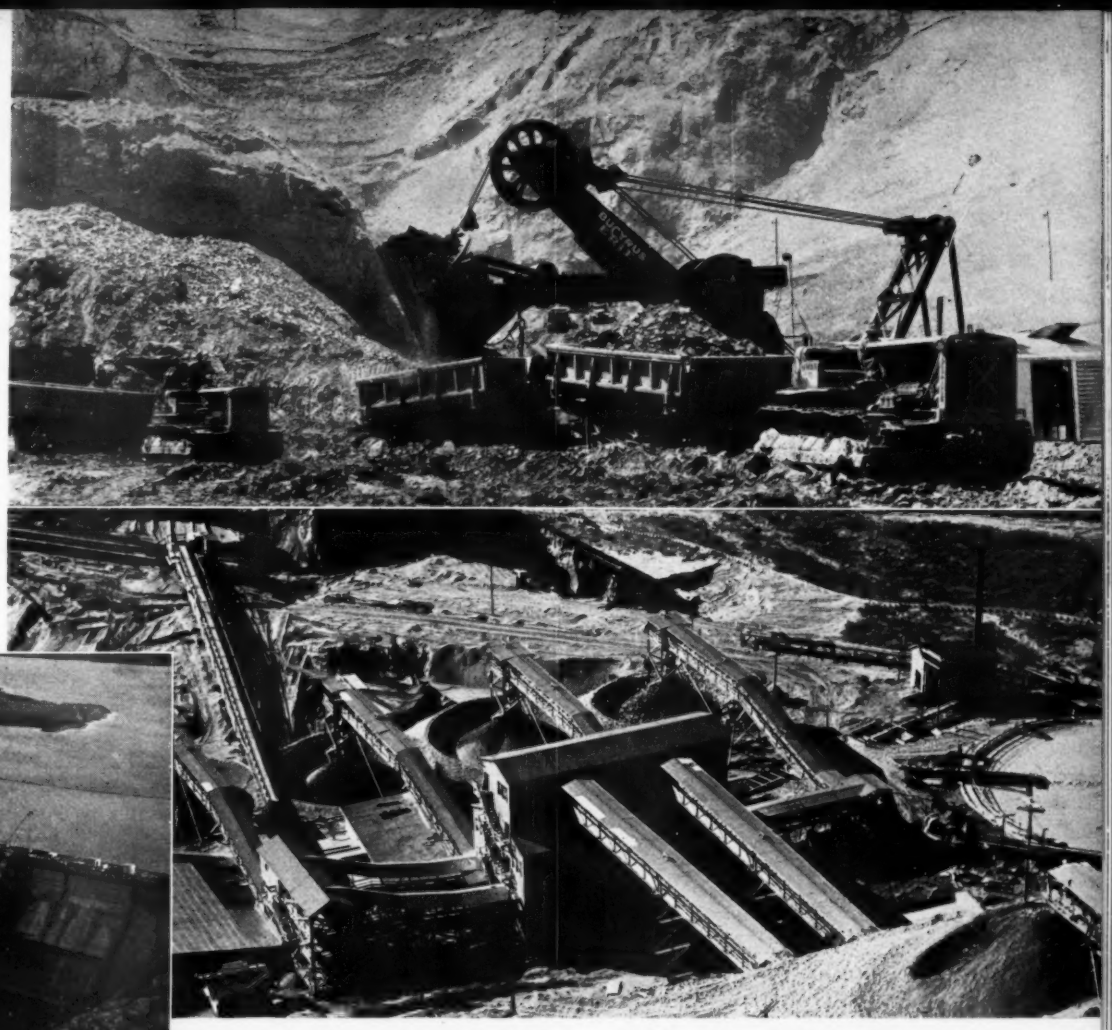
On a hillside a mile downriver and 900 feet above the dam, is the gravel pit that supplies material for the concrete. It is a rare coin-



• Above: This view of G Coulee taken in Novem 1940, shows the struc about 95% complete. L top: Earlier view showing million dollar trestle whic now buried completely in concrete of Grand Coulee D Bottom: Another "big" Grand Coulee was this s sheet piling cofferdam. largest ever built, it held b the Columbia's waters du the pouring of the west foundation and abutmen

EXCAVATING engineer

ght, top: Caterpillar-towed
y wagons are loaded by a
rus-Erie 1¾-yard shovel
g foundation excavation
tions. Below: Grand Cou-
sand and gravel washing
cleans and sorts 3,500
of mixed material per
Washed and graded ag-
te piles are shown, the
yor in the background
to the waste sand pile.



cidence that an almost unlimited supply was found so close to the natural damsite.

In the six years of concrete pouring, a hole has been dug in the hundred acre area large enough to bury a good sized city, and the seven yard electric shovels, capable of lifting an automobile in their buckets, are still clawing deeper into the mountain.

Large Scale Aggregate Production

On most construction jobs, sand and gravel are taken by truck to the concrete mixers, but not at Grand Coulee. Here it is carried on rubber conveyor belts, first to the screening and washing plant and then to the storage piles beside the house of the magic mixer. Because the pit is on the hill, gravity power can be utilized to run the belts. The big shovels dump their loads into hoppers, fastened to swinging elbows which follow the dippers wherever they go. The endless belt carries the excavated material out of the pit in a steady stream to the 70-ton crusher, biggest in the world. This monstrous device chews up the over sized rocks and spits them out in little pieces into another hopper. The belt picks up again and away goes the material to the screening and washing plant, known as the "thunder house" because of the ear-splitting racket within. In this house, amidst a din and rumble like a constant earthquake, the last speck of dirt is removed from sand and pebbles. There is an orderly confusion of conveyors, screens, chutes, water spouts and surprisingly few men in the thunder house that take care of 3,500 tons of material every hour.

When the washed sand and gravel come out, they are assorted in four sizes. Different grades of concrete require different grades of material and the stock piles of each are constantly being depleted and replenished.

One of the astonishing features about this cleaning plant is the amount of water it requires. Twenty millions gallons are used every day, 14 million gallons in the sand clarifying ponds alone. Water is boosted 670 feet up the hill from the river.

From the storage piles near the washing plant, a 10,000-foot conveyor system carries 2,700 tons of sand and gravel an hour to the mixer on the wing of the dam. This belt is four feet wide and travels 700 feet a minute on its own gravity power. A 125 horsepower motor is used to stop and start it.

Grand Coulee's rubber aggregate railroad was manufactured in sections by the Goodyear Tire

(Continued on page 162)

GAVIOTA SERVICE INS

Residents of Gaviota Peninsula, California, are given "all around" service by Contractor J. J. Hergert, who changes the local typography on order

By FLOYD SUTER BIXBY

CALIFORNIA, like the stomach of a fat man, bulges out considerably toward the front. North of Santa Barbara it reaches the widest point. Here, at the extreme edge of a gently rolling peninsula backed by mountain ranges you can look north, south and west at the blue Pacific Ocean.

But if you look toward the east you'll more than likely see a little International pickup truck. It will have neat lettering on the sides, reading "Hergert Co.; Contractors, Gaviota, California." The "contractors" part of the sign, broken down to specific terms, means that Mr. Hergert is an excavating contractor, paving contractor, earthfill man, landscape artist, cement dealer, tile pipe contractor and machine operator. You can name the machine. In a word, so far as contracting goes, Contractor Hergert is Head Man up in Santa Barbara County. He takes care of most of the small contracting in the Gaviota Peninsula.

The Gaviota country enjoys typical southern California climate. The sun shines so much in summer that you wish it would rain. It rains so much during the winter that you pray for the sunshine again. Situated as this part part of the state is, near the ocean and more or less surrounded on three sides by water, it makes an ideal vegetable growing center. Night fogs rolling in from the ocean leave enough moisture to grow some of the crops but irrigation is generally practiced where lettuce, alfalfa and sugar beets are grown.

Constructing Irrigation Reservoirs

Not a small part of Mr. Hergert's work is the construction of reservoirs for irrigation purposes in this farming country. The topography slopes gently toward the ocean, with the water table comparatively near the surface. Even in the driest summer months the water table never sinks below 100 feet from the surface of the ground. Farmers all over the peninsula construct reservoirs to store the water pumped up from the water table by electric deep well pumps.

Contractor Hergert is his own engineer. With the help of one of his men (he keeps a crew of 12 men continually on his payroll), he located the most favorable site for the reservoir. Running his own levels, he cross sections the work site, plots up his notes on profile and cross section paper, and calculates yardage. Very often he takes his own soil samples by probing or boring, because the geology of this Gaviota Peninsula is something a good man can go wrong on unless he has some basis for fact. While most of Mr. Hergert's work is in bottom land, he also has bucked the granite at Montecito and fought adobe all over the peninsula.

A day or two after the initial survey, machines are moved in to do the job. To put up a typical storage reservoir Mr. Hergert does all the necessary stripping with a new International TD-14 tractor, fitted with a Bucyrus-Erie Model P-24 power control winch and the new Bucyrus-Erie cable controlled bullgrader. This machine is first used to clear away light brush, small stumps and to do the necessary pioneer work in rooting off the sides of gullies.

The scientific design of the bullgrader is especially useful on pioneer work or in hard or frozen ground. When Mr. Hergert first saw the bullgrader he thought it was not built high enough to dig and push much of a load. But after a few weeks of operation he saw that the curved face of the bullgrader was designed especially to cut and push the maximum possible amount of dozed material without "sticking" the tractor. According to Mr. Hergert the bullgrader works almost as well in adobe and conglomerate as it does in other material much softer.

As soon as the site is leveled off sufficiently for scraper work, the TD-14 picks up a Model S LeTourneau 6-cubic yard scraper, equipped with Goodyear 7.50x20 Earth

• J. J. Hergert's International TD-14 and LeTourneau scraper put the finishing touches on a land leveling project which will soon be ready for the crops of some Gaviota farmer.

Mover tires. This combination picks up and hauls objectionable material out of the foundation and levels off the fill site.

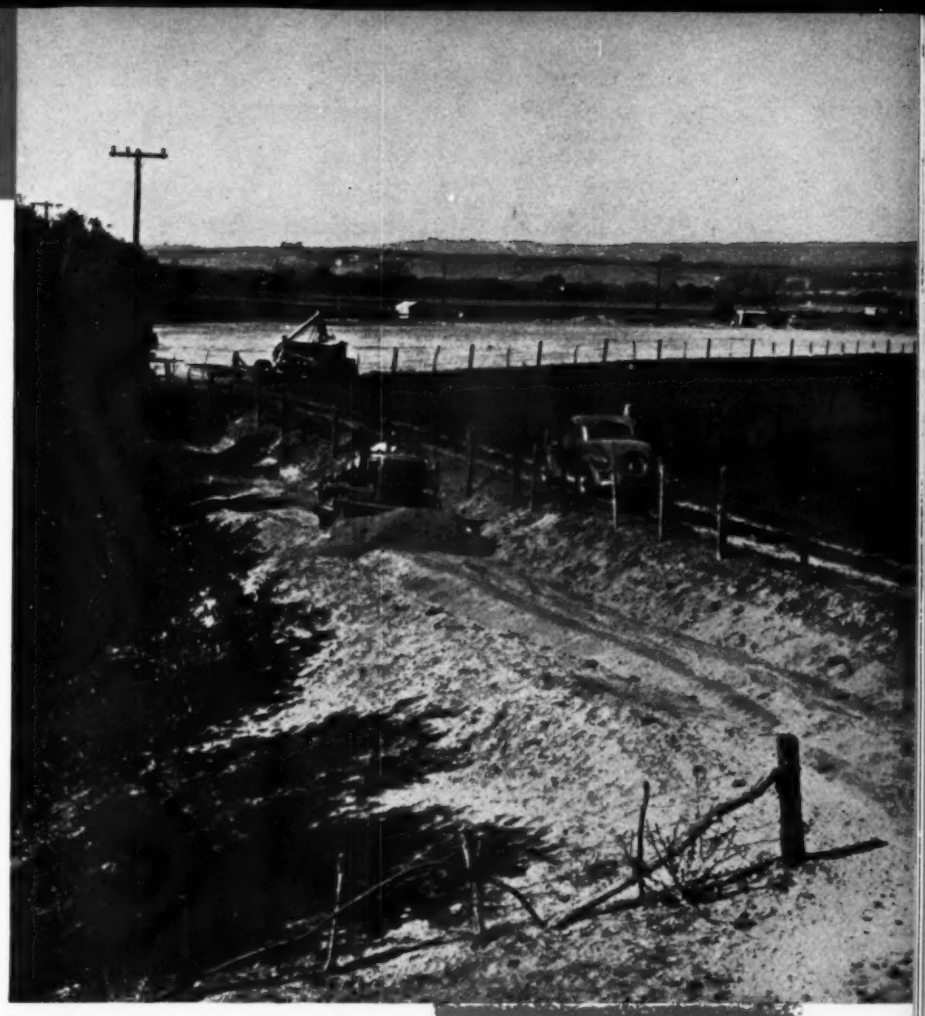
On this kind of work it is absolutely essential to have a combination which provides output, maneuverability, economy, and above all, easy changing of units. Mr. Hergert believes he has found the answer to this problem. For it took only ten minutes to pick up the Bucyrus-Erie bullgrader and have it operating. It took just fifteen minutes to drop the grader and hook up the scraper. The bullgrader is usually carried along except on long jobs where only the scraper is used.

The foundation for the typical reservoir is usually plowed and rolled down with a sheepsfoot type roller, ballasted so that at least 1,500 pounds per linear foot of tread is distributed over the rolled area. The embankment of the reservoir is then brought up gradually, spreading the dirt out in six or eight inch layers and rolling it after the earth has been correctly mixed with water.

Embankment material is generally dug from the reservoir area. This practice automatically increases the potential storage capacity of the reservoir and insures a short haul to the fill. Good management and good equipment have made it possible for Mr. Hergert to complete a reservoir in as little as one week's time.

When the reservoir is completed, the face which bears the load of the water gets a protective coat of sod or oil. The whole job is dressed up before turning it over to the land owner. The largest reservoirs which Mr. Hergert is called upon to build store about one million gallons of water.

Any reservoir backed by high ground or mountains is built with a connecting system of training channels rooted out by the Bucyrus-Erie bullgrader. Water falling during the winter season drains off the mountains and down the training channels into the reservoir. A full reservoir filled by Mother Nature near the start of the irrigation season saves some pumping time.



• After smoothing out the few acres in the background, the International cuts an access road to the field with a Bucyrus-Erie bullgrader.

Next, a Piping Job

In some cases, along with a reservoir job, goes a piping job. To locate a reservoir so that it will irrigate the lower adjacent country does not always mean that the finished structure will be alongside a deep well. In some instances a well has already been drilled in lower ground near the water table. In these cases it is necessary to lay a pipeline to carry the water from the pump to the reservoir for distribution over the thirsty land. Last winter Mr. Hergert laid 15,000 linear feet of 14-inch and 18-inch pipe, most of which was in 24-inch jointed lengths, made of concrete.

He has developed a system of procurement which makes him a real service institution around Gaviota. While land owners and vegetable gardeners make a fair profit on their produce, everybody knows that they do not have too much money to spend for concrete pipe, land improvements and the like. So Mr. Hergert has set himself up as a licensed dealer in various supplies. These include concrete and tile pipe, cement, fencing and other construction materials. By conducting his buying business on a cash basis he is able to pass some of the discount advantage on to the customers who contract for his work, and everybody is happy all around the circle.

All of Mr. Hergert's work is conducted on a straight hourly basis. On a reservoir the cost of the finished work is determined only by the number of hours worked. Hergert himself is quite a leader, and during the past three years

• Contractor Hergert mans the wheel of his own Galion Junior motor patrol as it spreads material on a road surfacing project near Lompoc, California.

has gathered a dependable crew around him. As much work is accomplished per day on the hourly basis as would be done on a fixed fee basis. Contractor Hergert sees to that. Proof that he does is seen in his constantly mounting backlog of work orders.

Because the soil is best suited for reservoir construction between October and May, owing to its increased moisture content, most of this work is done between those months. During the summer there is usually a road or highway job to do. Mr. Hergert subcontracts portions of the work and at the time of our visit he had just completed work on a highway contract near Gaviota for the California State Highway Department. His contract consisted of grading and resurfacing.

An International TD-40 tractor was used on this job to pull a 5-yard McMillan type scraper in slope cutting and dressing. Occasionally an Austin-Western pull grader was also used. Actual preparation of the roadbed was done with the TD-14 tractor-bullgrader and a Galion Junior motor patrol. Contractor Hergert pulled these machines from a job and sent them to Gaviota.

To transport his tractors Mr. Hergert uses either an International 6-wheel trailer or in the case of the TD-14 he uses a regular International 44 flat rack. The flat bed on this truck is just long and wide enough to accommodate the machine and the Bucyrus-Erie bullgrader. Roving state highway patrol officers get into the Gaviota Peninsula often enough that Mr. Hergert checked on both the weight and clearance of the tractor on the flat rack truck.

As the Gaviota Peninsula becomes more and more populated, so does it become necessary to reclaim and irrigate more and more of the land. In the natural state this virgin land falls in three classifications; level, rolling, and downright uneven. The best of the land has, of course, long since been under cultivation. Occasionally, however, a person crops out who by reason of ambition or necessity begins to farm a tract of uneven topography. The first person he usually calls in is Contractor Hergert.

Peaceful Panzer Operations

This business of leveling land is nothing new to him. Many a flowering acre became that way only after Hergert machinery leveled off the ground and arranged the fields for proper drainage. Like a Panzer division, his snorting machines level everything before them as peacefully efficient as do their warring contemporaries on European battlefields.

Land leveling, too, calls for cross sections, yardage estimates, and an estimated price to the prospective customer. Mr. Hergert is in an admirable position to do business with these Gaviota farmers because for ten years he has been doing business with them and knows most of them by name.

Land which is much too rough to farm must be leveled before it can be irrigated satisfactorily. If the land is generally within a 4-foot tolerance from any basic elevation, Mr. Hergert can level it off and scientifically slope it for drainage purposes for around $25 to $28 per acre. To properly drain this land of excess water applied during irrigation and to allow for winter rain runoff, Mr. Hergert likes to have about two inches of slope per 100 feet.

Leveling is easy to this man who has both feet on the ground and knows the capacity of his machines. Not easy is the problem of satisfying the farmers who have

"Hey, Joe, look at the sideburns!"

their land leveled. Land sections, yardage calculations, drainage and irrigation all follow certain cut and dried engineering principles. But the farmers as a class are strangely unhampered by engineering principles and it takes a diplomat or a magician to give them what they want in the way they want it.

According to Mr. Hergert, he has talked with farmers until he has affirmative palsy. But he seems to be successful in delivering what the farmers want, because he goes well recommended from job to job. Be he a Houdini or a Hull, he's the fellow up in Gaviota who delivers the goods.

Whatever he does, Hergert commands the healthy respect of these hard working dirt farmers. Late in the evening when the farmers are doing their chores or packing vegetables for market, Hergert and his boys are also finishing out their day's work. For Mr. Hergert requires all his machine operators to grease, fuel and take care of their own equipment as a part of their job. The boys like the idea. Feeling that they have an interest in the machines, they keep them humming to serve the Gaviota Peninsula.

Finland Constructs Petsamo Road

The government of Finland is actively engaged in developing Petsamo as a deep water port. Its plans for a railroad having been abandoned, the government has put 2,000 men to work on a motor road from Rovaniemi to the port. Five-thousand American trucks to haul freight and gasoline for them will be brought in Thorden vessels from the United States.

Finland is also constructing a warehouse at Petsamo but there are as yet no oil storage facilities at that port. The Thorden shipping lines have stated that, if possible, it is intended to maintain a fortnightly service from Atlantic coast ports of the United Kingdom to Petsamo, with seven of its ships now in the Atlantic.

Practically all cargo, either way, is for the Finnish government, which strictly controls freight.

• Above: The International-powered Bucyrus-Erie bullgrader bites into the dirt as it widens and grades a farm field access road. Below: This rustic swimming hole is a product of Contractor Hergert's equipment, who built it to order for a California movie executive.

Short on mileage, but long on yardage, D. Arrigoni's 1½-mile Connecticut highway job called for wide, deep cuts and high fills that involved the handling of 500,000 cubic yards

By SPENCER JONES

NEAR THE TOWN of West Willington, Connecticut, D. Arrigoni, of Middletown, Connecticut, is completing an 8,089-foot section of the Wilbur Cross Parkway, the relocation of about 2,065 feet of intersecting Route 32, and about 1,670 feet of modified cloverleaf approaches between the two highways. Here the Wilbur Cross Parkway is to pass over the relocated State Route 32 on a 93-foot skew span deck girder bridge, the construction of which is also included in the Arrigoni contract.

Route 32, which skirts the eastern edge of the Willimantic River valley, is being relocated about 300 feet to the west and about 25 feet lower than it was originally. Even at that, it rests on a light fill across a natural depression. And the Wilbur Cross Parkway, crossing the valley and river on a bridge and fill constructed by others, is elevated to such a height that a 50-foot fill is required at the overpass and deck girder bridge.

Wilbur Cross Parkway, which runs in a southwest-northeast direction in this section, continues on northeast from the overpass over the fill and up through a cut diagonally across a high hill. As the Parkway emerges from this cut, it passes on a fill along Roaring Brook, a tributary of the Willimantic River, with the brook side of the fill protected by rock riprap.

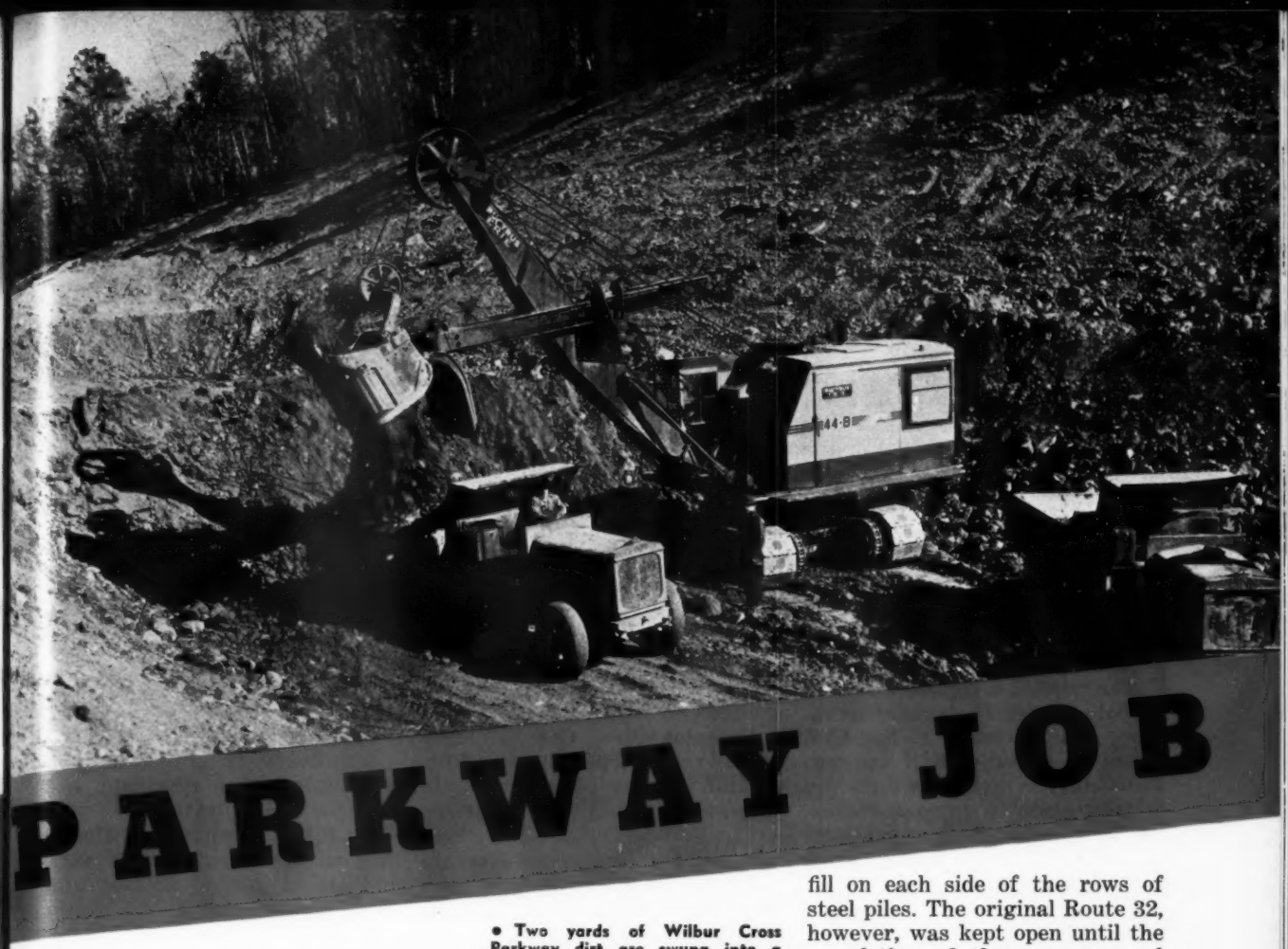
Finally crossing Roaring Brook with a triple-opening concrete box culvert, each opening being 14′ x 12′, the Parkway then traverses two more hills, necessitating deep cuts, and joins a recently completed section at the edge of a peaceful valley just at the foot of the last hill.

Contract Quantities and Prices

The contract, awarded May 7, 1940, in amount of $330,439.25, calls for completion within 400 calendar days and contains a $25 per day penalty clause. Quantities and prices of major excavating and surfacing items follow:

Clearing and grubbing, lump sum		$25,000.00
415,373	cu. yds. unclassified excavation at 19c per yard	78,920.87
2,800	cu. yds. trench excavation 0—5′ deep at $1.25 per yard	3,500.00

• Powered by Caterpillar RD8's fore and aft, a LeTourneau scraper picks up a full load of material on a downhill cut.



PARKWAY JOB

• Two yards of Wilbur Cross Parkway dirt are swung into a 5-yard Linn truck by the Bucyrus-Erie 44-B.

2,000	cu. yds. trench excavation 5—10′ deep at $1.25 per yard	2,500.00
140	cu. yds. trench excavation over 10′ deep at $2.50 per yard	350.00
65,829	cu. yds. borrow, complete in place, including furnishing and placing at 18c per yd.	11,849.22
32,583	sq. yds. formation of subgrade at 10c per yard	3,258.30
11,847	lin. ft. shaping slopes and shoulders at 50c per ft.	5,923.50
2,775	cu. yds. bridge excavation at $1.00 per yard	2,775.00
13,000	cu. yds. gravel fill sub base and culvert foundation, complete in place at 35c per yd.	4,550.00
2,703	tons broken stone for base, complete in place at $2.25 per ton	6,081.75
1,149	tons broken stone for bituminous macadam surface, complete in place at $2.60 per ton	2,987.40
5,236	cu. yds. class A concrete, complete in place at $11.00 per yd.	57,596.00
280	cu. yds. class B concrete, complete in place at $11.00 per yd.	3,080.00
26,075	sq. yds. furnishing and applying sand cover at 2c per yd.	521.50
8,432	bbls. Portland cement at $2.50 per bbl.	21,080.00
3,208	cu. yds. rolled gravel surface, complete in place at 75c per yd.	2,406.00

Nearly 400 steel bearing piles were driven with a steam hammer through the soft earth of the natural depression at the site of the overpass to support the concrete piers. Piles were trimmed to proper height with an oxy-acetylene torch.

While the piles were being driven, a Bucyrus-Erie 44-B diesel-powered shovel with a 2-yard dipper and a Bucyrus-Erie 34-B gasoline-powered shovel with a 1¼-yard dipper loaded out earth and boulders from the cut through the hill just northeast of the overpass. A fleet of six Mack and Sterling dump trucks with 5-yard bodies and four 5-yard Linns hauled the material down to the fill on each side of the rows of steel piles. The original Route 32, however, was kept open until the completion of the overpass and the relocation of Route 32 beneath it.

This cut and the other two were practically all earth, plentifully supplied with boulders. There was hardly any blasting to do on the entire job, which is rather unusual in New England highway construction. The digging was, therefore, rather easy except for the boulders, and the 44-B Bucyrus-Erie loaded out about 1,500 yards per 7-hour shift, while the 34-B handled 1,000 yards during the same period. Both could have done better, but the usual problem of available trucks and the spotting of them under the dippers was the factor that controlled shovel output.

Although the deepest cut was only about 40 feet, the fact that the cuts were all on sidehills and all through earth with 2:1 sideslopes increased the necessary yardage considerably over that of rock cuts of the same length and depth.

It was this combination of com-

paratively shallow depth, great width and considerable volume of easily handled material that made it practical for D. Arrigoni to use two LeTourneau 18-yard scrapers in the second, or middle cut. These scrapers, pulled by RD-8 Caterpillar tractors, proved to be highly efficient dirt movers under such conditions. When the scrapers required more pulling power than could be exerted by one tractor, another RD-8 Caterpillar with a LeTourneau bulldozer was used to push against the rear end of the scrapers until a full load was obtained.

A LeTourneau K-30 rooter, which the scraper-pushing RD-8 Caterpillar tractor was equipped to pull, was also used to advantage on the job.

Concrete Placing Operations

The triple box culvert was completed in the early stages of operation, as there was a 25-foot-high fill to be placed over it and you don't start to make cuts until you have a place to dump the excavated material. A Ransome E-27 mixer handled the concrete for this culvert as well as for the piers under the deck girder bridge of the overpass.

A three-compartment Blaw-Knox bin was erected, each compartment having a capacity of 35 tons. Sand was stored in one compartment and the others held two sizes of stone. A fourth, and separate bin, held 300 barrels of Portland cement. These bins were located near the overpass, where the greater mass of concrete (for the overpass piers) was to be poured.

Carnegie Steel Company furnished the deformed steel bars for reinforcing the cement concrete structures, and American Bridge Company supplied the structural steel for the deck girder overpass bridge. Carnegie also furnished the H-beam steel bearing piles.

Rough grading of fills was done with two RD-6 Caterpillar tractors, equipped with LaPlant-Choate bulldozers. An RD-4 Caterpillar tractor, also equipped with a LaPlant-Choate bulldozer, was used for general utility work.

The Wilbur Cross Parkway and the modified cloverleaf approaches are receiving a rolled gravel, treated surface, while the relocated Route 32 is being paved with bituminous macadam. Sub base course is a gravel fill, varying from 5 to 22 inches in thickness. Widths of pavement also vary, but are in general 22 feet wide and 4 inches thick.

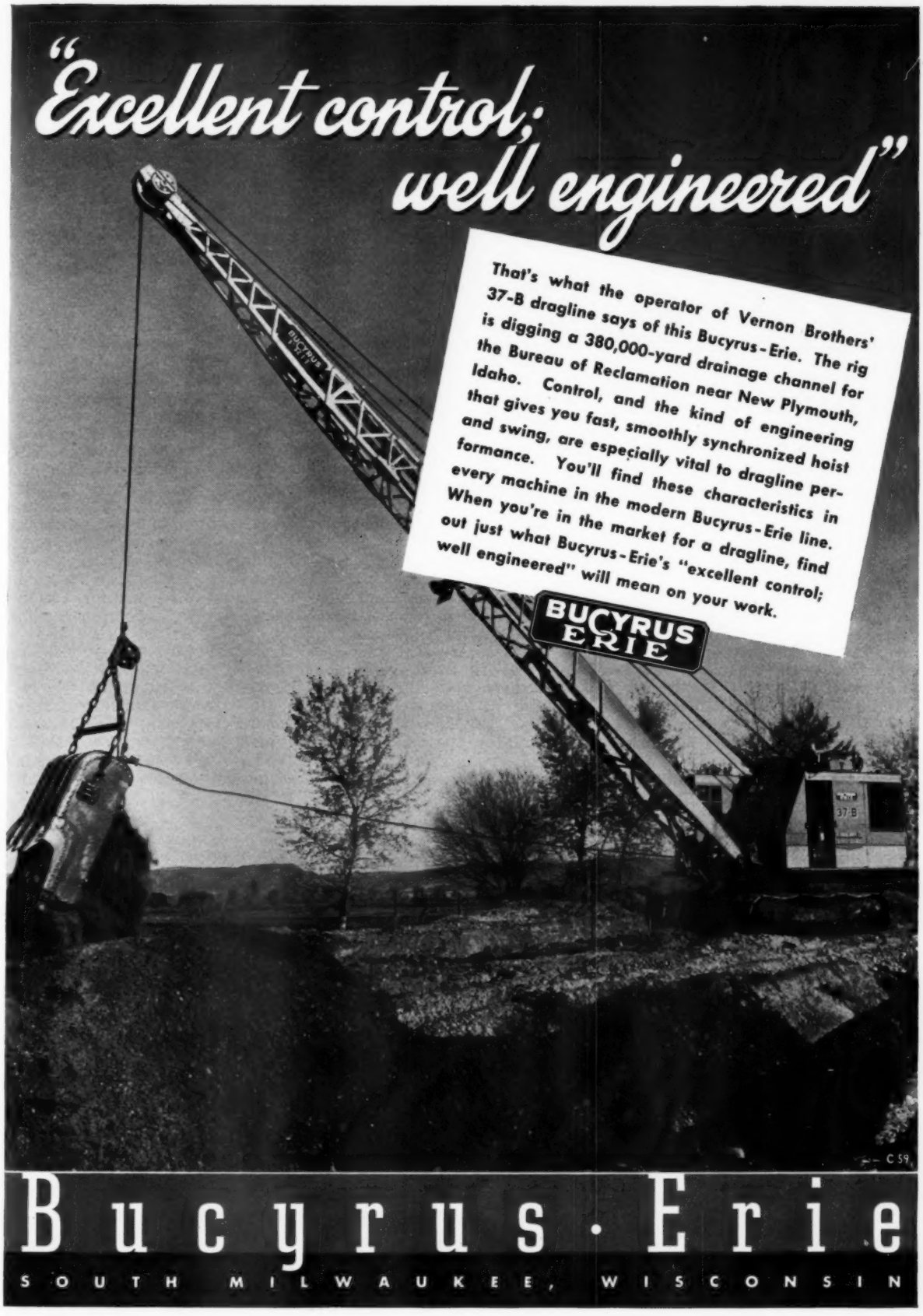
The job is Federal Aid Project F. A. P. 130-D (1), hence working hours and wages are under Federal and State supervision. Dudley Kiely, senior engineering aid, is resident engineer in charge for the Connecticut Highway Department. Key man on the job for D. Arrigoni are: Tony Arrigoni, superintendent of construction; Robert Scussel, assistant superintendent; Ernest Malcarne, bridge superintendent; Alfred Luhr, office manager; and Dave Narsiff, timekeeper.

• Left: Tony Arrigoni, superintendent of construction for D. Arrigoni. Right: General view of fill placing operations at the site of the Parkway overpass. At the left a steam piledriver puts in steel piles to support the overpass foundations.

• This Bucyrus-Erie 1½-yard shovel handled its share of material on the Arrigoni Wilbur Cross Parkway contract.

Germany's Highway Expenditures

Germany's expenditures on motor roads, construction and maintenance during 1939 amounted to 1,120,800,000 Reich Marks, approximately $443,000,000. Germany's road mileage in 1939 was 262,874 miles; her area, 245,992 square miles. The State of Texas is slightly larger with 265,896 square miles; but where Germany has 262,874 miles of road, Texas has 167,042 miles of which only 17,790 miles are surfaced.


"Excellent control; well engineered"
That's what the operator of Vernon Brothers' 37-B dragline says of this Bucyrus-Erie. The rig is digging a 380,000-yard drainage channel for the Bureau of Reclamation near New Plymouth, Idaho. Control, and the kind of engineering that gives you fast, smoothly synchronized hoist and swing, are especially vital to dragline performance. You'll find these characteristics in every machine in the modern Bucyrus-Erie line. When you're in the market for a dragline, find out just what Bucyrus-Erie's "excellent control; well engineered" will mean on your work.
BUCYRUS ERIE
37-B
C 59
Bucyrus·Erie
SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

EXCAVATING ENGINEER

A Monthly Publication

Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

F. O. WYSE, *Manager*
ARNOLD ANDREWS, *Assistant Manager*
D. B. REED, JR., *Editor*
M. J. BARGENQUEST, *Associate Editor*
JOHN I. MORAVEC, *Art Director*
DELMAR COHEN, *Assistant Editor*
E. M. HEUSTON, *Sales Manager*
E. F. BRIESEMEISTER, *Assistant Editor*

Review of 1940 Construction

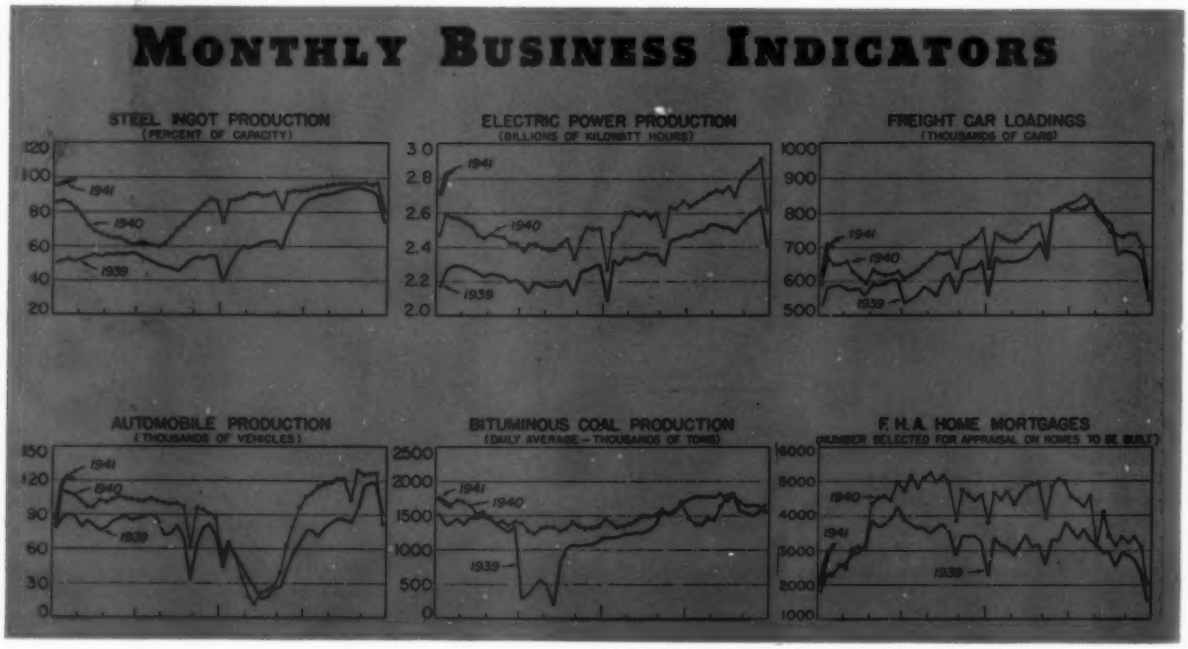
Building and engineering contracts awarded in the 37 eastern states during the year 1940 reached a total of $4,003,957,000, according to F. W. Dodge reports. This total, largest since the year 1930, represented a 13 per cent increase over 1939. Last year was the seventh consecutive year of construction volume increases. The 1940 record included: $1,294,-000,000 for non-residential buildings, representing a 34 per cent increase over the preceding year; $1,596,944,000 for residential buildings, a 20 per cent increase; and $1,112,373,000 for public works and utilities, an 11 per cent decrease from 1939.

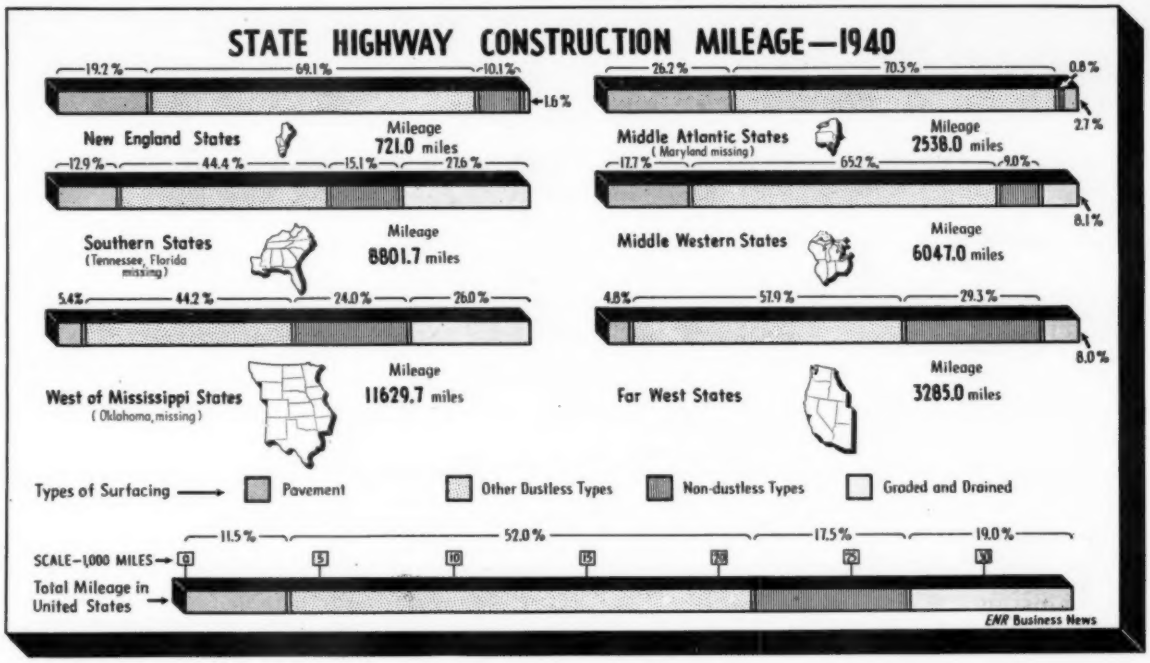
Public construction projects were predominantly defense projects for army, navy, and air force, the large volume of which more than offset the decline in civilian public improvement projects that took place throughout the year. Private commercial, manufacturing, and residential buildings all increased very considerably. For the year as a whole, private ownership construction increased 19½ per cent over 1939 in dollar volume, compared with a 5½ per cent increase in public ownership projects.

Residential building had, last year, its largest contract volume since 1929, consisting principally of small house construction. The residential contract total of $1,-596,944,000 was divided as follows: apartments, hotels, and dormitories, $331,331,000, a 14 per cent decrease from the preceding year; one- and two-family houses, $1,154,868,000, a 24 per cent increase; other shelter (principally buildings of the barracks type), $110,745,000, nearly a seven-fold increase. The total number of new, combination, and converted family dwelling units provided in one- and two-family houses increased nearly 16 per cent from 271,386 in 1939 to 314,369 in 1940.

The big construction increase of 1940 was far from evenly distributed throughout the country. Very large increases were recorded for New England, the Middle Atlantic states, the Southeastern and Gulf sections, Southern Michigan, and the Kansas City area. The Chicago and St. Louis areas had moderate increases (10 per cent in each case); the Pittsburgh and Cleveland areas just equalled their 1939 records; the Minneapolis area ran slightly behind the previous year; while the New York State-Northern New Jersey area and the Cincinnati area ran considerably behind 1939.

Commenting on the 1940 record, Thomas S. Holden, vice president in charge of statistics and research for F. W. Dodge Corporation, stated: "All the demand factors that prevailed during the second half of last year carry over strongly into 1941. In addition to further defense construction, the record volume of industrial production anticipated for this year tends to stimulate employment, national income, and demand for private commercial, industrial, and residential building and electric utility construction. While the construction industry has the capacity to handle a considerably larger volume of business than it had in 1940, the size of the private building market is going to depend very greatly upon the highly critical question of stable building costs. Dodge is estimating for this year, it believes conservatively, a 14 per cent increase over 1940 in total building and engineering contract volume; this estimate assumes that 1940 private construction volume will be maintained in 1941, with the bulk of the increase occurring in public ownership projects. The general





• Percentages of the various types of surfacing used on 1940 state highway construction work are conveniently presented in this chart which also tabulates the total mileage of 1940 road construction. (Chart reproduced through the courtesy of Engineering News-Record.)

spread of consumer purchasing power may result in a better territorial distribution this year than in 1940."

Dangerous Playthings!

Accidents to children from playing with blasting caps in the United States showed a decrease in 1940 as compared to 1939 according to data in the hands of The Institute of Makers of Explosives of New York City. In 1940 the record shows that 157 children were injured from this cause in accidents occurring in 33 states. In 1939 there were 195 boys and girls injured. One child died as the result of one such accident in 1940.

As in other years nearly every case shows that the blasting caps apparently had been carelessly left about where children could get them. In forty-three instances the children reported after the accident that they found the caps near construction work, or in fields, streets, roads, in quarries, and in three cases on dumps. In fourteen instances they found them in buildings outside the home and in ten instances they picked them up in cupboards or other parts of the home.

The age at which these accidents mostly occurred, according to the record, was from 11 to 15 years inclusive. There were 63 instances within these age limits. There were 51 instances among children from five to ten years old. And there were 12 instances even among children five years and younger.

There were 146 boys and 11 girls concerned in the accidents. The usual thing they did on finding the caps was to pick them with nails or pins, hammer them or throw them into bonfires. There were 58 instances of these three methods.

In two cases they exploded them in guns and in seven cases they wired the caps to an electric current.

When the cap exploded, the fragments of metal injured the children on the hands, fingers, face, body and legs. In 24 cases their eyes were injured.

As usual in past years the great majority of the accidents took place either in rural localities or near small towns. Eighty-five per cent of the injuries occurred in those sections.

The statistics related above are just cold figures, but behind each case is a painfully hurt and perhaps permanently disfigured child as well as a grief stricken mother and father. Isn't that a pretty big price to pay for someone's carelessness?

Highway Tax Collection vs. Road Expenditures

Although gasoline tax and motor vehicle registration fee collections increased nearly one-half a billion dollars last year over similar revenues a decade ago, the amount spent for the maintenance and construction of state roads increased only $11,000,000, according to figures compiled from official governmental sources by the American Petroleum Industries Committee.

Diversion, debts, and "divvying" were found to be the three principal factors absorbing the increased automotive tax receipts. The cost of debt service has doubled in the past decade, last year amounting to 173 million dollars, a rise which the committee attributes largely to the fact that numerous highway bond issues authorized a decade or more ago are now being retired.

The distribution of motor vehicle tax funds to municipalities and other local governmental units, or "divvying," virtually has been doubled in the past decade. The greatest increase, both in dollars and percentage, was found to be in the amount diverted by the states. In 1929 all but two per cent of the motorists' tax dollar was used for highway improvement purposes, while last year nearly 15 per cent of the amount collected was placed into states' general funds and not used directly or indirectly for roads.

Equipment

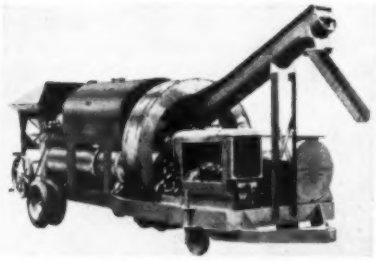
you ought to KNOW ABOUT

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Portable asphalt plant

Manufacturer: Universal Crusher Company, 625 C Avenue Northwest, Cedar Rapids, Iowa.

Claims: Eliminates much conveying and rehandling of material. Has a twin hopper from which material is metered by a mechanical feeder to twin dryers —sand to one and aggregates to the other. These rotary dryers are heated by oil fired burners. Heat that escapes from the dryers is utilized to heat the asphalt in the 700 gallon tank above the dryers. From the dryers the material is elevated by the rotavator to the screw plug mill. The tumbling and discharge action aerates the material releasing steam resulting in a drier material. Hot oil is added in the pug mill and the agitator screws thoroughly cut, mix and blend the material at the same time conveying it to a swivel chute for truck loading. 9′ 6″ wide,

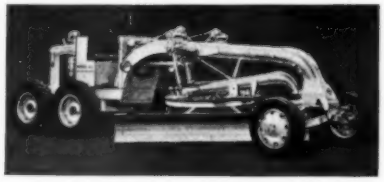


less than 30′ long overall, 11′ 2″ high, weighs only 11 tons. Dual pneumatic-tired rear wheels. Has a retractable trailer hitch so that it can be towed by truck or tractor. This hitch can be pushed under the frame when not in use. The plant is supplied materials by conveyor or fed directly from a bin.

Motor grader

Manufacturer: Allis-Chalmers Mfg. Company, Milwaukee, Wis.

Claims: Designed for heavy grading, bank cutting, ditching (both forward and reverse), oil mixing and snow removal. Weighs 21,500 lbs. and has 75 diesel horsepower. Greater earth-moving capacity is attained through more clearance under the front axle and circle. "Hi-arch" front axle has 22 inches of clearance and there is 6¾ inches of clearance between the "Roll-away" blade and the circle. Power is supplied by General Motors 2-cycle diesel engine developing 75

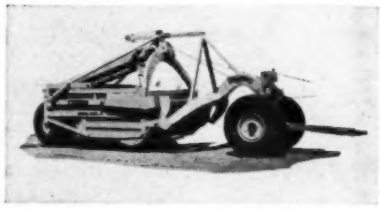


brake horsepower. This motor offers unit injection, four-way cooling, faster acceleration, smoother power, easy starting, and full protection of air, oil and fuel filters. Transmission features include short, heavy shafts and carburized and hardened gears. Has a range of six forward and three reverse speeds. Ten-inch tubular frame plus heavy box section girders with a vertical section modulus at the lift cases supports of 86.0. Lift cases are mounted directly over the circle for rigid blade control. Full revolving blade has a bank cutting angle of 90 degrees and has a blade reach outside the front wheels of 5′7½″. The chain driven tandem drive assembly is supported on a 4½ inch main drive shaft. Standard equipment includes electric starting and lighting, leaning wheel front axle, adjustable radiator shutters, muffler, 12-ft. moldboard, two 7.50-24 (10 ply) front tires and four 12.75-24 (8 ply) rear tires. Other specifications for special conditions.

LeTourneau Carryall

Manufacturer: R. G. LeTourneau, Inc., Peoria, Illinois.

Claims: Struck capacity is 12.1 cubic yards, and heaped 15. Apron cable dead-ended for longer cable life. New apron design for increasing capacity, reducing overflow and facilitating loading by reduced friction. New overhead traveling sheave assembly which keeps dirt out of the sheaves. Scraper incorporates positive ejection and regulated spread, controlled cutting, tailgate cable pull at load center, and box beam arc welded construction for greater strength and light weight. Loads efficiently without aid of a pusher. Newly designed blade base and an 8′6″ cutting blade. Bowl sides are built to eliminate loss of loaded material by overflow or spillage.



No. 23 paving breaker

Manufacturer: Independent Pneumatic Tool Company, 600 West Jackson Blvd., Chicago, Illinois.

Claims: Powerful, light in weight, and incorporates the most recent advances in paving breaker design. Increased output insured as the lighter weight makes it possible for the operator to handle the tool with greater speed and less fatigue. Designed for general demolition work—streets and wall openings, asphalt cutting, digging, and a variety of odd jobs where only a single tool is needed. Equipped with the hard hitting power necessary for sustained demolition on big construction jobs. Can also be fitted with a special head for driving spikes up to 12″ long.

REGULAR INSPECTION SAVES WIRE ROPE DOLLARS

No. 7 in a series of informative articles for wire rope users, prepared by the Macwhyte Wire Rope Company. Previous articles in series available on request on your company letterheads.

It Pays PLENTY to Inspect Your Wire Rope REGULARLY

Don't wait until a failure occurs before examining your wire ropes. Look them over at regular intervals.

Close examination will not only indicate when it's time to put on a new rope but it will also reveal many things about the way your rope likes its work—whether it is suited to the job.

For instance—wires breaking without showing wear indicate excessive bending—sheave and drums are too small or rope construction is too coarse.

Rope crushing or flattening indicates too much pressure—improper winding—or rope not constructed to withstand the condition.

Whole strands or entire rope breaking soon after installation means overloading . . . or indicates the need for a stronger or larger diameter rope. INSPECT YOUR ROPES REGULARLY and you will become familiar with the behavior of your wire rope. This will enable you to detect many enemies you can correct to your own satisfaction and savings in Rope Cost.

If your ropes are not adapted to the work they are doing and the reason is not apparent—call in your Macwhyte wire rope representative or consult the manufacturer of your equipment.

REMEMBER — Macwhyte is ready to help you whenever you call. Men at Macwhyte who *make* "The CORRECT rope for your equipment" and study it on the job, know how to get the most out of a rope. They'll gladly give you the benefit of their experience.

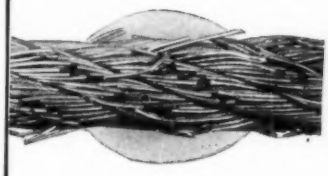
MACWHYTE COMPANY

2940 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of rope wire—braided wire rope slings—Monel Metal and Stainless Steel wire rope—aircraft cable, tie-rods, and "Safe-Lock" terminals for aircraft—and wire ropes for all requirements.

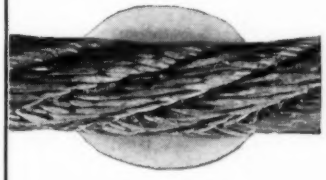
New York · Pittsburgh · Chicago · Ft. Worth · Portland
Seattle · San Francisco
Distributors throughout the U. S. A.

Are these common causes for wire rope failure costing you money?



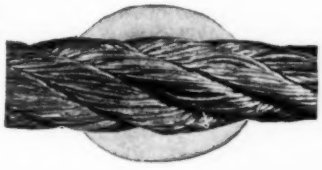
1. Sheaves too small. This rope was forced to travel continuously over sheaves whose diameters were too small. This caused severe bending fatigue. Result—broken wires, ruined rope. (Note: PREformed rope would have lasted much longer in this case.)

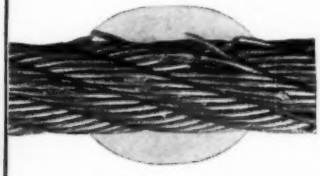
2. Drum abrasion and abuse caused this. The rope was scuffed over and over against previous wraps on a flat-faced drum. Its life ended long before it should have.



3. Kinking caused this. The dog-leg, or kink, was finally straightened out of this rope . . . but notice the uneven wear at the point where the kink had been. Beware of dog-legs! They're expensive.

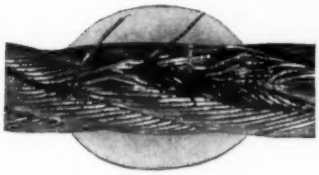
4. Uneven drum winding is a frequent rope-wrecker. This rope was wound unevenly time after time on to a drum. Result—it is crushed and flattened. The service cost of this rope was unnecessarily high. WATCH how the rope winds!





5. Acids Did This. This rope was attacked by high Sulphur content in the water and crude oil through which the rope operated. A heavily internally lubricated rope will resist the action for a time.

6. Foul Play "killed" this rope. While in operation, this rope met with an accident that mashed and cut many of its wires. Result—a ruined rope, and many a rope dollar wasted that could have been saved.



For your convenience in writing to Macwhyte Company, you will find a card bound in this issue.

"World's Biggest"

(Continued from page 149)

and Rubber Company and cost the contractors an average of $9 a foot. Besides the main conveyor, there are three miles of other belt conveyor, ranging from 32 to 60 inches wide.

When the supply operator at the concrete mixer pushes a button on his control board, air-controlled gates at the screening plant a mile up the hill, open under the designated storage pile and dump the material onto the belt.

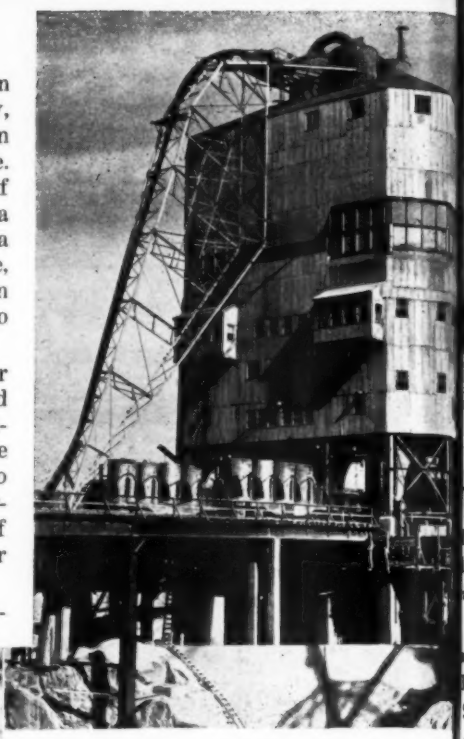
It is possible to store a five days' supply in the piles near the washer and the mixer so that the one belt is able to do all the carrying. Shorter and steeper rubber railroads also carry material from the storage piles to bins atop the five story mixing plant.

Gravel and sand are picked up at the east shore of the river, but the cement comes from storage silos on the west bank at the railroad terminus. Here, again, there is no hitch in speedy delivery. A pipeline 7,000 feet long runs across the trestle above the dam from the silos to the mixing plant, and cement is puffed through it at a hundred-mile-an-hour clip by pressure blowers.

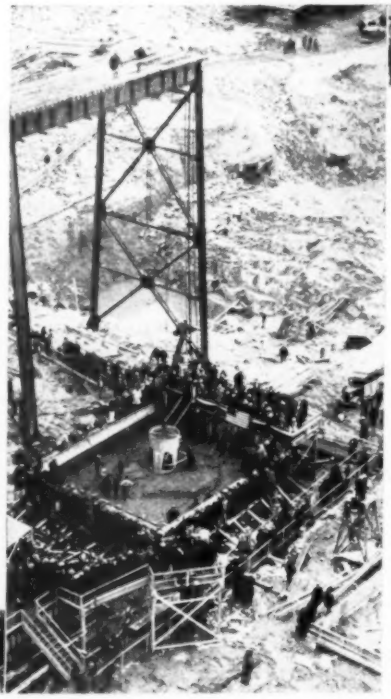
Feeding the cement silos during the height of concrete pouring kept five manufacturing plants in the west running at full capacity, and also kept a full time train running on an overtime schedule. As many as a hundred cars of bulk cement were unloaded in a day, and at one time, following a record breaking pouring spree, the contractors had to shut down to wait for the cement makers to catch up.

Handling the cement is another phenomenal procedure. Loaded cars are pulled up beside an unloading platform and from there the loads must be shifted into eleven 5,000 barrel tanks for storing and blending. A barrel of cement is equal to about four sacks.

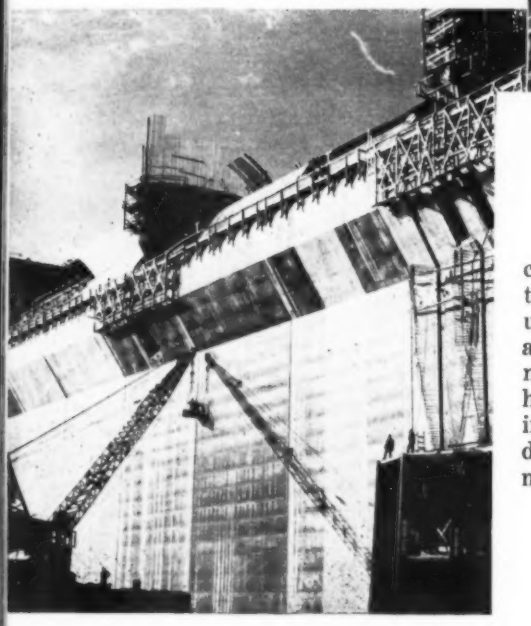
For unloading, CBI uses specially-built six-ton vacuum cleaner type pumps. The pumps have an unloading capacity of 375 barrels an hour, and are operated by one man to a pump. This operator holds an electrical control device in his hand and by tipping the device one way or another, the machine is caused to move as desired into the loaded car, sucking and blowing the cement into the silos. One of these super-suckers can unload a car in 20 minutes.



• Grand Coulee's "house of magic" is a Siamese-twin concrete mixer that constantly consumes sand, gravel, cement and water and continuously pours out concrete to the cars below.



• Governor Martin of the State of Washington inaugurated Grand Coulee concrete pouring operations by dumping the first bucket of mix in December, 1935.



• A floating crane swings workmen close to the reservoir side of the dam so that they can clean, chip, and patch rough spots in the concrete.

When it is blown across the river through the pipeline, cement goes into a special tank in the top story of the mixer. Air is allowed to escape and the cement settles into two 675 barrel bins.

Grand Coulee Magic

With material ready for use, delicate but massive mechanism of the house of magic is set in motion from an electrical control board. Once started, the machinery goes through its operation automatically, delivering yard after yard of concrete into the open mouths of concrete buckets below.

The actual magic gets underway when a dispatcher receives a call from the trestle foreman asking for a certain grade and quantity of mix. This information is relayed through a series of colored lights in front of the operator.

Getting the signal, the operator

ARE YOU MAKING a Donation AGAIN THIS YEAR?

HOW much money are you going to sink into excess aggregate through loss of yield on poorly prepared subgrade this year? It costs you enty if you make the slab too thick and in most states you pay if the ab's too thin — you're between the devil and the deep, and *you lose ither way!*

But Buckeye R-B Power Finegrader owners don't suffer these losses — nd they use less labor and never hold up the paving crew because their Finegraders move out fast and cut the grade *right on the payline!* Smooth, accurate and true. No low or high spots that spell trouble and money!

Stop the "Donations" and make bigger profits this year on concrete or macadam jobs with a Buckeye R-B Finegrader. A size for every job — 8′ to 24′. WRITE FOR 8 PAGE BULLETIN NOW! BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio.

READ What These STATE HIGHWAY ENGINEERS Have to Say!

". . . loss of yield would probably range from *five to ten percent*, and this is largely attributable to extra slab thickness." — *Engineer of Construction.*

". . . we do know that contractors have lost considerable in yield because of not having subgrade properly prepared." —*Chief Engineer.*

"Overruns vary from an average of 1½% to *as high as* 8%. Where overruns occur they are generally the result of low subgrade and excessive thickness of pavement." — *Engineer of Materials and Tests.*

"Smoothness and trueness of subgrade are *necessary, desirable* and *required*, . . . the method chosen is that which works out to the best advantage of the party contracting to do this work."—*Construction Engineer.*

See Page 145

Built by Buckeye

Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

• An early construction view, showing high-scalers drilling with air hammers on the west abutment. Top workings of the dam in preparation for the next lift can be seen below.

sets a selector valve for the proper material, pushes another valve to load the batchers and then moves the valve backward to discharge them. Material flows into automatic weigh-batchers which are preset and which cut off the flow at the pre-determined weight. Then, using an air valve, the operator deposits the various full tanks into a cone-shaped chute which carries material into one of the four-yard mixers.

Signal lights flash on during the mixing process and automatic pens scrawl charts of progress in front of the operator. When the mix is finished, in exactly two minutes, other lights flash to notify the operator. While one batch is being churned, the revolving chute turns to other mixers and they in turn are set to grinding. When each batch is mixed, the mixers tilt and dump concrete into another funnel under which the trains with buckets are waiting. There is no stop, no lost motion. It's as regular and methodical as clockwork.

These concrete trains, each carrying four 4-yard buckets, operate on a high trestle 3,600 feet long and 43 feet wide. The trestle frame work contains nine thousand tons of structural steel and cost more than a million dollars to build. It has been gradually buried in this rising concrete which will eventually cover it entirely.

There are 14 of the diesel powered concrete trains, each operated by one man. Loads are 44 tons, or four of the 11-ton buckets. The trains shuttle back and forth across the four track trestle, traveling 500 to 600 miles a day and creating a switching problem that is in itself a wonder of railroading in solution. One or two of the trains are constantly under the mixer spouts.

Out on the trestle, loaded buckets are snatched from the trains by cable hooks dangling from the largest cranes ever built. These portable monsters have a reach of 165 feet either side of a center line, longer over-all than a football field, and have a comfortable lifting capacity of 11 tons. Based on an elevator scale, this would be equal to raising and lowering 147 people. The cranes are 105 feet high and weigh 275 tons apiece.

Once the bucket is hooked on, the crane operator, in constant communication by telephone with a signalman out of sight hundreds of feet below or above, delivers the load to the desired location. Workmen in the 50-foot square forms trip the bucket trigger and the four yards of concrete pour out. Another signal and the bucket sails away into the air, back to the train on the trestle. The buckets can be lowered 100 feet, emptied and hoisted in a minute and fifteen seconds. Some of the cranes let down their loads 250 feet, equivalent in height to a 24-story building.

This, then, is how the concrete is handled but even more amazing is the volume.

The Boys Break Some Records

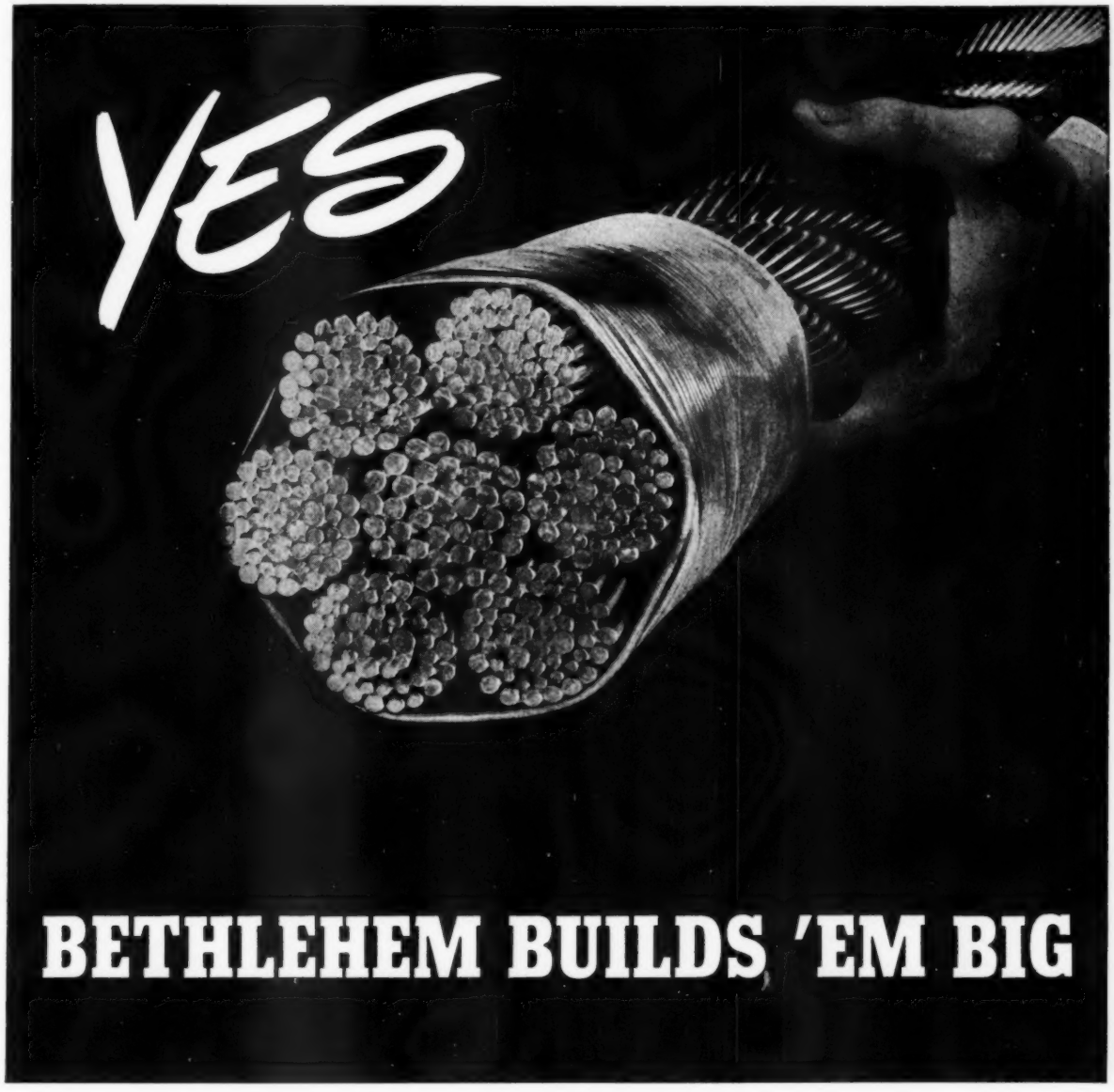
One day during 1939, the lads who go to work at midnight on the graveyard shift, clipped seconds off of every operation for eight hours and wound up with a 6,724 yard total.

Men of the day shift picked up the challenge and stepped up the pace. They raised the total to 6,884 yards. They went off work grinning. Then came the swing-shift and when they left the job at midnight, they had poured 6,973 yards. The total was 20,581 cubic yards, one yard poured and placed every 3.8 seconds for every 24 hours of the day. It was double the previous record set at Boulder Dam, and it eclipsed by 2,000 yards the theoretical capacity of the house of magic.

That pace could not be continued of course, but in the month of September that year the contractors poured 440,000 cubic yards, a quantity that would cover a football field 25 stories high, enough to build a standard highway 225 miles long.

The supreme achievement was not reached until October, 1939, however, when 530,539 cubic yards went down the shuddering chutes. It would take a train 530

• An Allis-Chalmers tractor pushes a 'dozer through broken stone as it cuts a new roadbed above the Grand Coulee reservoir.



BETHLEHEM BUILDS 'EM BIG

If you've got a job that calls for really big wire rope, check Bethlehem before you buy.

We've recently installed several large rope-closing machines. These machines are new, completely modern in design. They are controlled by the ace operators in our mill.

And note this fact: The steel that goes into Bethlehem wire rope is produced, from start to finish, by Bethlehem blast furnaces, open hearths, rolling mills, drawing blocks and patenting furnaces. Bethlehem controls every step.

Result? When you buy Bethlehem wire rope, whether it's large or small, you get rope that performs consistently, day after day, month after month. You get long average service . . . and after all, it's the average service that determines your rope costs.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

For your convenience in writing to Bethlehem Steel Co., you will find a card bound in this issue.

• WPA crews clean out timber and brush from land that will be the bed of the Coulee reservoir.

miles long to haul all the sand and gravel used in that month, and another train 225 miles long to carry the cement.

Peak of employment at the dam was 6,600 men, and the average wage has been $1.10 an hour. To date, about 50,000,000 working hours have been spent in actual construction operations. The payroll of Grand Coulee Dam will reach fifty million dollars when the job is finished.

Big things and unusual things are really the rule rather than the exception at Grand Coulee. There will be a man-made lake behind the dam 151 miles long. Nine towns had to move bag and baggage to get out of the way of rising water in the 85,000 acre reservoir. Two million feet of timber is being cut and 2,500 men have been working two years clearing brush and debris.

Even the weather is unusual. Temperature at the dam ranges from 114 degrees in the shade in summer to 20 below zero in winter. Water in the river rises and drops as much as 50 feet between high and low stages, and increases in volume from 20,000 cubic second feet in winter to as much as 700,000 cubic feet in flood stage.

It will take 11 million cubic yards of concrete to make up the finished dam, this volume will weigh 25 million tons. Seventeen thousand tons or 127 miles of steel sheet piling was used in the largest cofferdam, and 31,000 feet of holes were bored in the granite bedrock in test work, these holes ranging from an inch to three feet in diameter.

World's Largest Power House

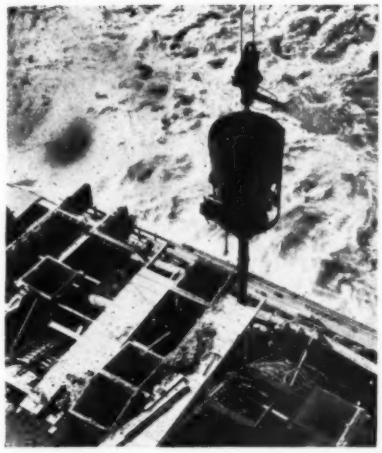
The biggest power house on earth, two blocks long, will turn out the greatest single block of energy, 2,420,000 horsepower, when completed. The nine turbines, three of which are now being built, will each weigh 750 tons. They are 30 per cent larger than any now in existence. Three of them would be able to supply all the electrical needs of a city of 50,000. Each generator will be 24 feet high and 45 feet in diameter.

To cool the concrete, 2,000 miles of pipe are being installed in the dam as it is poured, so that water can be pumped through the great mass. In addition, there are seven miles of galleries and inspection tubes honeycombed inside the dam.

Irrigation of the million and a half acres of land in the Columbia Basin is to be made possible by a pumping plant that will lift 2,300,000 cubic feet of water a day. Twelve tunnels, drilled for 450 feet at a 50 per cent angle through solid granite will carry the water into the reservoir 250 feet above the dam. These pumps, not yet constructed, will be the largest ever built, and each of them will be capable of irrigating a hundred thousand acres.

Among the safety features introduced to workmen are steel helmets to protect them from falling objects, puncture-proof shoes

• Hard rock men at work on one of the 12 tunnels on the west abutment that will carry water from the pumping plant to the thirsty acres of Columbia Basin. The tunnels run at a 50° angle and are 15 feet in diameter and 450 feet long.



• Holes and cracks around dam tubes are filled with concrete from a 4-yard bucket equipped with an elephant trunk hose.

to keep nails out of their feet, and salt pills to prevent heat prostration in the summer temperature.

The MWAK Company built a city without smokestacks for their workers, using electricity for heating, and the CBI added houses without nails, using glue to stick the walls together. Some 12,000 residents of the dam towns, and all the combined machines of the builders use 36 million gallons of water every day.

One can keep writing about this twentieth century engineering miracle almost indefinitely. The Brobdingnagian figures come and the Paul Bunyan deeds go while the dam climbs higher and higher. When the big slab is finished, 25,000 men will have had a part in the job and yet the entire project will be only well started.

There are two dams yet to build which will make a 30-mile reservoir out of a gully carved by glacial ice, and the hundreds of miles of canals which will carry water to thirsty acres have yet to get out of blue print stage.

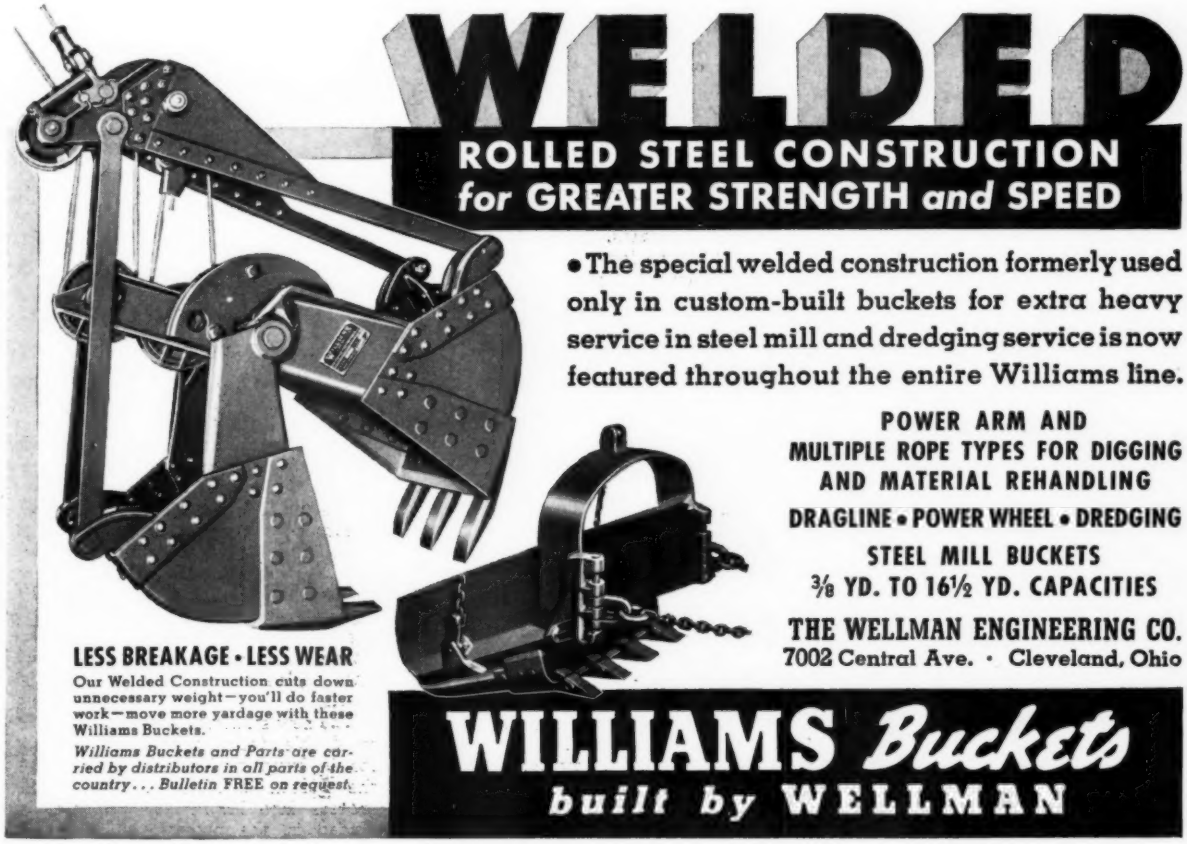
The job is being done in the state of Washington but it is no project for that state alone, or even for the Northwest. It and all of its engineering wonders make up a national development, designed to provide homes for thousands and jobs for millions. It is a job that puts Cheops and his 260,000 slaves of 50 centuries ago, rather in the shade.

1940 INDEXES AVAILABLE

Complimentary copies of Excavating Engineer's 1940 Index are available to all who request them. Address your request to Excavating Engineer, South Milwaukee, Wisconsin.

Highway Developments in China

At the close of 1936 about 60,000 miles of highways, of which 15,000 were surfaced and 45,000 graded dirt roads, were open to traffic. Of this mileage, about one-third was in East China which has suffered severely from active warfare and most of this mileage had not been restored at the close of 1939. In West and Southwest China the Chinese Government has constructed about 3,500 miles of new roads and improved 10,000 miles of existing roads, bringing the total length open to traffic in 1939 to 52,000 miles.


WELDED
ROLLED STEEL CONSTRUCTION
for GREATER STRENGTH and SPEED
• The special welded construction formerly used only in custom-built buckets for extra heavy service in steel mill and dredging service is now featured throughout the entire Williams line.
POWER ARM AND
MULTIPLE ROPE TYPES FOR DIGGING
AND MATERIAL REHANDLING
DRAGLINE • POWER WHEEL • DREDGING
STEEL MILL BUCKETS
3/8 YD. TO 16½ YD. CAPACITIES
THE WELLMAN ENGINEERING CO.
7002 Central Ave. · Cleveland, Ohio
LESS BREAKAGE • LESS WEAR
Our Welded Construction cuts down unnecessary weight—you'll do faster work—move more yardage with these Williams Buckets.
Williams Buckets and Parts are carried by distributors in all parts of the country... Bulletin FREE on request.
WILLIAMS Buckets
built by WELLMAN

For your convenience in writing to The Wellman Engineering Co., you will find a card bound in this issue.

Shots from the FIRING LINE

ARBA Stresses Defense Road Needs

Concern over the lag in meeting defense highway needs dominated the closing discussions at the annual convention of the American Road Builders Association held in New York from January 27 to 31.

Critical comment was directed at the federal government for failing to make immediate plans to rid strategic defense highways of serious "bottlenecks" that threaten to hamper national defense operations. E. Donald Sterner, commissioner of the New Jersey State Highway Department started the expressions of protest against the FWA attitude that improvement of express highways through cities and the construction of by-passes around towns are not essentials and might be postponed in the present defense road program. In refuting this viewpoint Commissioner Sterner pointed to the serious congestion existing on all major highways along the North Atlantic seaboard, a congestion that would be greatly increased in time of emergency when adequate roads would be of utmost importance for our mechanized forces.

A four-day program of well attended general sessions and group discussions was inaugurated by the keynote speech of ARBA President Hal G. Sours who further stressed the need of constantly improving and enlarging present defense highways.

Penn Turnpike Extension Shelved

By Bethune Jones

Extension to Philadelphia of the Pennsylvania Turnpike now linking Harrisburg and Pittsburgh, probably will be postponed until after the defense emergency, it was indicated in Harrisburg February 10, when it was reported that RFC officials in Washington had rescinded an informal $20,000,000 loan offer for the project and deferred consideration indefinitely.

Notification was said to have been given interested persons at Harrisburg that the action taken was in line with President Roosevelt's policy of shelving large-scale construction by the federal government during the present emergency to keep it from competing with defense industries for cement and steel.

Hope was expressed, however, that the turnpike extension project may be included in the President's "after-the-war reservoir" of works projects to take up the unemployment slack.

A plan for construction of the link under a Federal Authority to be named by the President was said to have been prepared by United States Senator Guffey. Such an arrangement would call for the construction costs to be financed totally through federal loans and grants. It would have no connection with the present Pennsylvania Turnpike Commission or the State of Pennsylvania.

It has been agreed by Penn highway officials that the only means of financing the extension is through federal agencies or assistance from such agencies. It would cost between $60,000,000 and $70,000,000 according to previously announced estimates.

Although no formal application for a loan was ever submitted to the RFC, it was reported that the $20,000,000 offer was made by Jesse Jones, RFC head, during a series of informal conferences several months ago with Walter A. Jones, chairman of the Turnpike Commission.

• **Dedication crowds visit the new $3,175,000 inter-state bridge which will span the Piscataqua River to connect Portsmouth, New Hampshire and Kittery, Maine. (Arthur Belcher Photo.)**

Speed Panama Canal Work

Work on the jointly-held contract of Martin Wunderlich Company and Okes Construction Company, the first major contract in connection with construction of the Third Locks project at the Panama Canal, is going ahead in full swing after the formal signing of the contract in the office of Lt. Col. T. B. Larkin, supervising engineer, Diablo Heights, Canal Zone, on January 20.

Men and equipment arrived on the Wunderlich-Okes contract in February and proceeded with plans to work the job on a 24-hour-a-day basis. Overburden, stripping and construction of suitable access roads before the start of the rainy season which might bog down equipment, were the first two major tasks to be tackled by the contractors.

The joint-bid of $8,517,100 for excavation of the new Gatun locks structure, approach channel and appurtenant works, involves the handling of about 12,000,000 cubic yards of material. Major excavation tasks are excavation of the locks site, a railroad relocation, a drainage canal and grading for the railroad.

Lt. Col. T. B. Larkin is the supervising engineer of the Third Locks project aided by Major Hans Kramer, assistant supervising engineer and construction engineer. Both Mr. Wunderlich and Mr. Okes are actively supervising their own contract.

Maine, New Hampshire Build $3,175,000 Inter-State Bridge

By F. N. Hollingsworth

With the official opening recently of the new double-deck inter-state bridge, across the Piscataqua River from Portsmouth, New Hampshire, to Kittery, Maine, an important link in the national defense highway system along the eastern seaboard was completed and a serious bottleneck of motor traffic eliminated. The bridge is on U. S. Route 1 through New England, from New York up near the coast into Maine. With the highway approaches on both sides of the bridge, which by-pass the city of Portsmouth, it is the biggest highway undertaking ever attempted by the two states.

The new structure consists of a 2,798-ft. double deck span, the upper deck for highway traffic and the lower for the Boston & Maine Railroad, which crosses into Maine at this point. Included in the project, which was fi-

GARGOYLE

Lubricants

The Emblem of 75 YEARS' PIONEERING in "Correct Lubrication" 1866-1941

WHEN YOU CALL IN SOCONY-VACUUM, you profit from these four important lubrication advantages:

1. SKILLED LUBRICATION COUNSEL of a Socony-Vacuum Man backed by 75 years' experience... greatest in the petroleum industry.

2. A COMPLETE LINE OF LUBRICANTS... a scientifically correct oil or grease for each and every job in your plant.

3. NEW LUBRICANTS ahead of new needs ...developed in close cooperation with machine builders by the famous Socony-Vacuum Research Laboratories.

4. HALF-A-MILLION CASE HISTORIES behind the recommendations of our engineers.

SOCONY-VACUUM OIL CO., INC.—Standard Oil of New York Division—White Star Division—Lubrite Division—Chicago Division—White Eagle Division—Wadhams Division—Magnolia Petroleum Co.—General Petroleum Corp. of Cal.

"Correct Lubrication"

For your convenience in writing to Socony-Vacuum Oil Co., you will find a card bound in this issue.

Mitchell Davis Follansbee

His many friends in all parts of the country were shocked to learn of the sudden death of Mitchell Davis Follansbee on January 26 at his home in Chicago, Illinois, as the result of a heart attack.

Long prominent in the affairs of Bucyrus-Erie Company and its predecessor the Bucyrus Company, Mr. Follansbee served as a member of that organization's Board of Directors and as General Counsel from November, 1911, until his death. He was also Chairman of the Company's Executive Committee for the last 25 years of his life, having held that office since 1915.

Mitchell D. Follansbee was born in Chicago, Illinois, on January 23, 1870, the son of George Alanson and Susie Dana Follansbee. He attended Harvard College and Northwestern University, receiving degrees of A.B. and LL.B., and in 1915 Northwestern University conferred upon him the honorary degree of LL.D.

Admitted to the Illinois bar in 1894, Mr. Follansbee practiced law in Chicago as a member of his father's firm, Follansbee, McConnell and Follansbee and, more recently, Follansbee, Shorey & Schupp.

His professional skill and integrity, together with his sincere and friendly personality, made him one of the best known and respected members of the Bar. He was frequently retained as counsel by many of the largest interests in the United States. He served as President of the Illinois Bar Association and was active on the Boards of some of our largest organizations, including the Metropolitan Life Insurance Company and the Erie Railroad.

Apart from his professional ability, his outstanding characteristics were his friendly spirit and his keen sense of humor. Few men have lived in this country with a greater number of personal friends than Mitchell Follansbee and all of them held him in the highest respect.

Mr. Follansbee is survived by his wife, the former Miss Julia Rogers McConnell; three daughters, Mrs. Helmut von Erffa, and the Misses Susan and Julie Follansbee; and two sons, Mitchell Davis, Jr. and Rogers.

Charles Sidney Porter

Charles Sidney Porter, a well known figure to many West Virginia contractors, died January 12, in a Huntington, West Virginia hospital at the age of 53. Death came after a five week siege of coronary thrombosis.

Mr. Porter, at the time of his death, was the active head of his own company, the Charles S. Porter Supply Company of Huntington, which handled contractor's equipment and supplies.

During the earlier weeks of his illness he was under hospital treatment and care. He rallied and returned to his home, but a relapse resulted in his immediate return to the hospital, where his condition failed to improve.

Charles S. Porter was born in Highland County, Virginia, on May 28, 1887, the son of S. A. and Lillian Lightner

Gay Porter, both of whom are deceased. He was educated at Augusta Military Academy, and Virginia Polytechnic.

After completing his studies in these Virginia schools, he engaged in business at Atlanta, Georgia, where he lived two years after his marriage to Miss Pattie Miller. In 1916 Mr. and Mrs. Porter moved to Huntington where he joined the Miller Supply Company.

A number of years later Mr. Porter left that company to organize the Charles S. Porter Supply Company which is now under the leadership of his brother, H. H. Porter.

Charles Sidney Porter was survived by his widow; a daughter, Miss Claire Tinsley Porter and two brothers, Howard and Russell Porter.

nanced by means of a grant of $1,735,000 from the Public Works Administration and a loan of $1,440,000 from the Reconstruction Finance Corporation are a by-pass highway and relocation of a number of formerly intersecting highways, with some other changes.

Work was carried on by various contracts, under supervision of a dual commission from New Hampshire and Maine, known as the Maine-New Hampshire Bridge Authority, which will also operate the bridge under a toll system for vehicles, the trains passing over free. Tolls will vary for different types of vehicles and will be applied toward amortizing the RFC loan.

A vertical lift draw 224 feet long over the Piscataqua River channel provides for passage of U. S. navy ships to the navy yard at Kittery and commercial ships to wharves at Portsmouth. Two towers that raise the span are 200 feet high, each tower having a 100 horsepower hoist motor and a 50 horsepower synchronous motor. The span weighs 1,100 tons and is lifted by 32 cables, 1⅜ inches thick, at each end. It can be lifted 135 feet above high tide in about 1½ minutes. The towers are enclosed in metal sheathing welded into place, this requiring 9,000 linear feet of welding. At this point the river channel is 65 feet deep.

There are 28 concrete steel reinforced piers, nine of them on dry land, nine more in shallow water and nine in deep water, one going down to a depth of 90 feet, for which large steel caissons, designed and assembled by the foundations contractor at a nearby dock were required. The two main piers, costing $250,000, are each 70 feet long, 30 feet wide and are in 67 feet of water, supporting the steel towers of the lift span.

Each tower has steel and concrete counterweights weighing 445 tons each. Pumpcrete, piped from two machines stationed on the bank, was used for filling in the piers. There are 5,200 tons of structural steel in the girders and trusses, while the roadway of the bridge proper, constructed by Ellis C. Snodgrass of Portland, Maine, is steel reinforced every foot, over a million pounds being used, beside 20,000 bags of cement and 500,000 board feet of lumber for forms. Pouring of concrete continued all through cold weather, with cement curing by steam. Corrugated iron copper bearing pipe, supplied by the Bancroft & Martin Rolling Mills of Portland, was laid for bridge drainage.

Bridge foundations were put in by the Frederick Snare Company of New York, and the bridge steel work was fabricated and placed by the Phoenix Bridge Company, Phoenixville, Pennsylvania. About 50,000 cubic yards of gravel fill was excavated for the caissons sunk.

Approaches to the bridge form the first divided lane highway in either state. There are four 11-ft. lanes, divided by an 8-ft. planted strip, with the roadway on the New Hampshire side, beginning at the tollhouse point, a few hundred feet from the bridge, widened

to six lanes. Approaches begin 3.2 miles back from the bridge on the New Hampshire side, constructed by the John Iafolla Company of Dedham, Massachusetts, for $561,797 and by the Littleton Construction Company, Littleton, New Hampshire, for 1.2 miles, on the Maine side, at a price of $350,000. These costs include reconstruction of former roads leading to the old Memorial Bridge, and of by-pass roads which ease into the new highways.

Sub-grade was 18 inches of gravel, topped by heavy duty concrete. Beneath the sub-grade the fill was of selected material, free from boulders. Excavation for the new approaches and by-pass re-surfacing amounted to 257,000 cubic yards. Bituminous macadam, was used for re-surfacing old roads that connect with the bridge approaches and for the by-pass that takes traffic away from the bridge to northern New Hampshire points. There are nine grade elimination structures over principal highways intersecting the inter-state highway, including one railroad overpass. Gradient of the inter-state highway does not exceed 3 per cent. Shoulders are 4 feet wide and the slope is 1:1. Some 300,000 cubic yards of earth, rock and gravel were required for fill on the inter-state highway to bring it up to bridge grade, with a 5 ft. deep gravel ditch on either side and reinforced concrete pipe culverts, ranging from 12 to 36 inches in diameter.

Concrete work called for 80,000 barrels of cement, 50,000 cubic yards of stone, 50,000 cubic yards of sand and 5,000,000 feet of lumber. For concrete paving, 2½ inch gravel was used, and for other purposes, two and one inch gravel. Sand comprised 35 to 40 per cent of the total aggregate. There were 100,000 square yards of surfacing.

New York to Complete Lincoln Tunnel

By Bethune Jones

Frank C. Ferguson, chairman of the Port of New York Authority, has announced that construction of the north tube of the Lincoln Tunnel will be resumed and completed because of the steady increase in the use of the south tube and pending improvements in New Jersey connecting highways. Specifications for contracts are being drafted, it was stated, and it may be possible to resume actual construction in the early summer, in which case the north tube may be ready for traffic by the close of 1942.

Estimates are that remaining work will cost close to $6,000,000. Construction of the tube was deferred about three years ago after the bore and other rough work had been finished from the Weehawken Plaza to a point just west of Eleventh Avenue, Manhattan. The first contract that will be awarded will call for extending the bore from its present Manhattan terminus to the site of the plaza at a point between Tenth and Eleventh Avenues and

This 4 cu. yd. SAUERMAN Scraper operating from a movable tower, digs and loads into cars 1550 cu. yds. in 8 hours. Thus a sewage tank basin 1250' x 360' x 30' is excavated in record time.

Speed material - handling with a SAUERMAN Machine

The great need of the hour is for SPEED and that is what you are assured when you use a SAUERMAN Machine for your long haul material-handling work.

You can handle a given yardage of any loose material at any range from 100 to 1500 ft. in **shortest time** and at **lowest cost** with a SAUERMAN Scraper or Cableway.

These machines are equally efficient whether working in dry ground or under water, can be operated by any mechanic, and require very little maintenance attention.

Write for the free SAUERMAN Catalog showing hundreds of typical installations.

SAUERMAN BROS., Inc.
474 SO. CLINTON ST. CHICAGO, ILLINOIS

You can't beat it for

- **EXCAVATION**
- **ROAD WORK**
- **QUARRYING**

SPECIAL OFFER!

You can have a three weeks' trial of the Load Lugger on the job by taking advantage of our Special Introductory Offer—ask us about it.

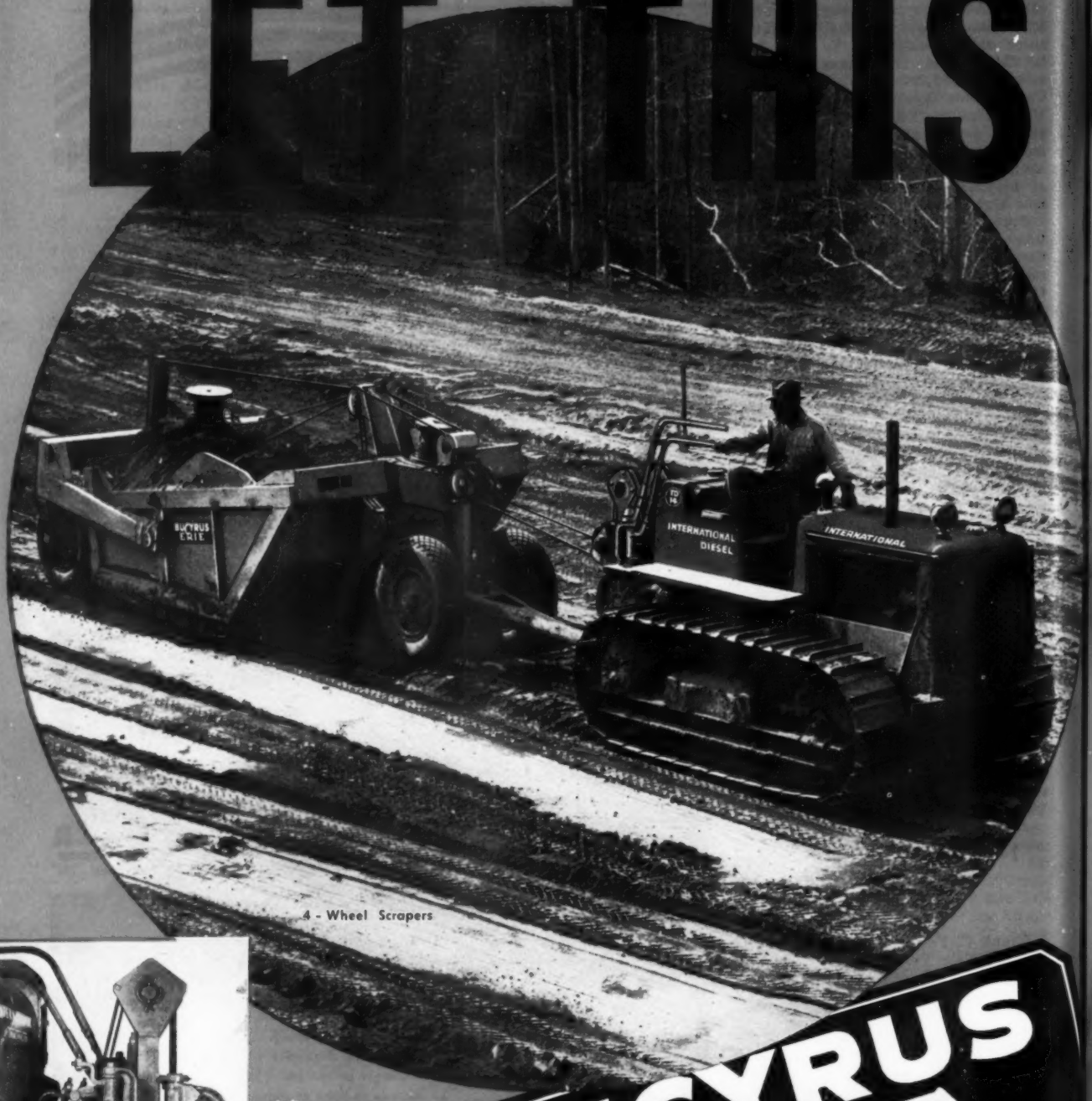
"The fastest dump truck equipment on wheels," is the opinion of engineers who have "clocked" the Load Lugger on the job. Think of it . . . only about 15 seconds to hoist or dump the loaded bucket! On a test run in a quarry, it increased production as much as 100 tons per day. The contractor on this job reported that his Load Lugger replaced three ordinary dump trucks and reduced his material handling costs by 25c a ton. It's a real "Brooks-krieg" for material moving wherever loading is done by hand.

Write for information

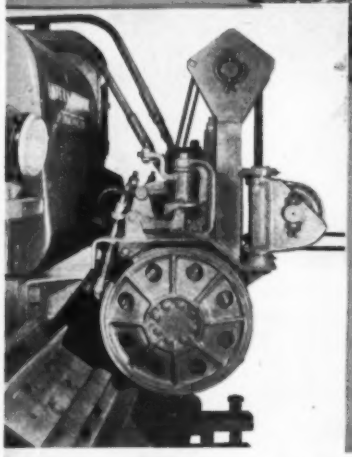
Brooks EQUIPMENT AND MFG. CO.
KNOXVILLE 303 Davenport Road TENNESSEE
Distributors in all Principal Cities

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

LET THIS



4 - Wheel Scrapers



Left:
Power Control Units

Lower Left:
Cable Bullgraders & Bulldozers

BUCYRUS ERIE

Cable Rippers

Rotary Rippers

Tamping Rollers

Combination

work for you!

You can't beat the combination offered you by Bucyrus-Erie tractor equipment and International TracTracTors. When you buy this combination, you get equipment with a backing second to none in the dirt-moving industry . . . the backing afforded by the engineering, manufacturing, and sales facilities of both International Harvester Company, the world's leading builder of tractors, and Bucyrus-Erie Company, the world's leading builder of excavating machinery.

If you are trying to get the lowest cost per yard in dirt-moving and the lowest cost per hour on tractor operation, look into the benefits of this combination. Consult your International Industrial Power dealer. Discuss your problems with him. Give him a chance to show you how Bucyrus-Erie and International can help you get big output at low cost . . . Bucyrus-Erie Company, South Milwaukee, Wisconsin, U.S.A.

Bucyrus-Erie tractor equipment is the only fully developed line of tractor equipment sold only through International Industrial Power dealers.

P65

Hydraulic Bulldozers | Hydraulic Bullgraders | Scraper-Bullgrader Dual Units | 2-Wheel back-dump Scrapers

● Stripping operations at Shook & Fletcher's red ore mine on top of Red Mountain near Trussville, Alabama, are handled by a Bucyrus-Erie 50-B diesel dragline.

Thirty-ninth and Fortieth Streets. Later contracts will provide for tiling, paving, electrical and other equipment installations, ventilating buildings, etc.

National Defense Keynotes AGCA Convention

Speeding of national defense construction, and expansion of private construction markets with the least possible conflict with defense activities were the chief topics of the 22nd annual convention of The Associated General Contractors of America. The convention was held February 17 through 20, 1941 at the Rice Hotel, Houston, Texas.

General convention discussion largely followed the trend of a pre-convention statement by Managing Director H. E. Foreman, who had previously announced:

"The convention will have serious business to transact. General contractors are being called upon by the government to execute two billion dollars of defense construction with the utmost speed and efficiency.

"The Associated General Contractors of America is being called upon more than it ever has been before to assist the government and general contractors on the general problems of the defense construction program.

"The convention will have a double task. First it must bring about a concentration of information about the defense program so that general contractors will have all necessary information for the proper execution of their contracts. Second it must formulate the policies by which government and the general contracting industry can cooperate to carry out the defense program with even greater speed and efficiency, and at the same time with the minimum of conflict with the billions of dollars of other construction which must be carried on."

New IRBA Head Stresses Illinois' Road Needs

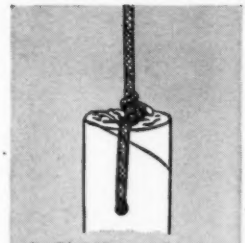
The flat prediction that Illinois faces an "immediate crisis" in highway transportation because "of dilly-dallying

To Lift With Ease
Use HERCULES

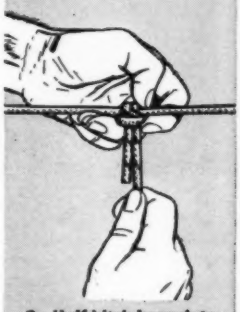
Hercules Hoists lift the load ahead of body center, assuring an easy, powerful lift without excess strain on any part of the unit. Double lift arms prevent cramping. Hoists are available with lifting capacities up to 20 tons. Hercules Dump bodies are designed for every type of excavating work. Write for catalog No. 8E.

HERCULES STEEL PRODUCTS CO.
GALION, OHIO

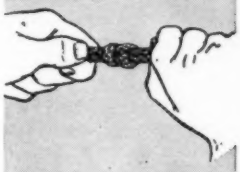
For your convenience in writing to Hercules Steel Products Corporation, you will find a card bound in this issue.



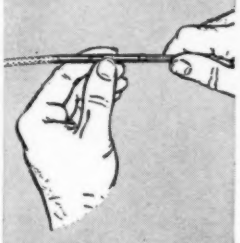
1. Tie through cartridge.



2. Half hitch branch to main line.



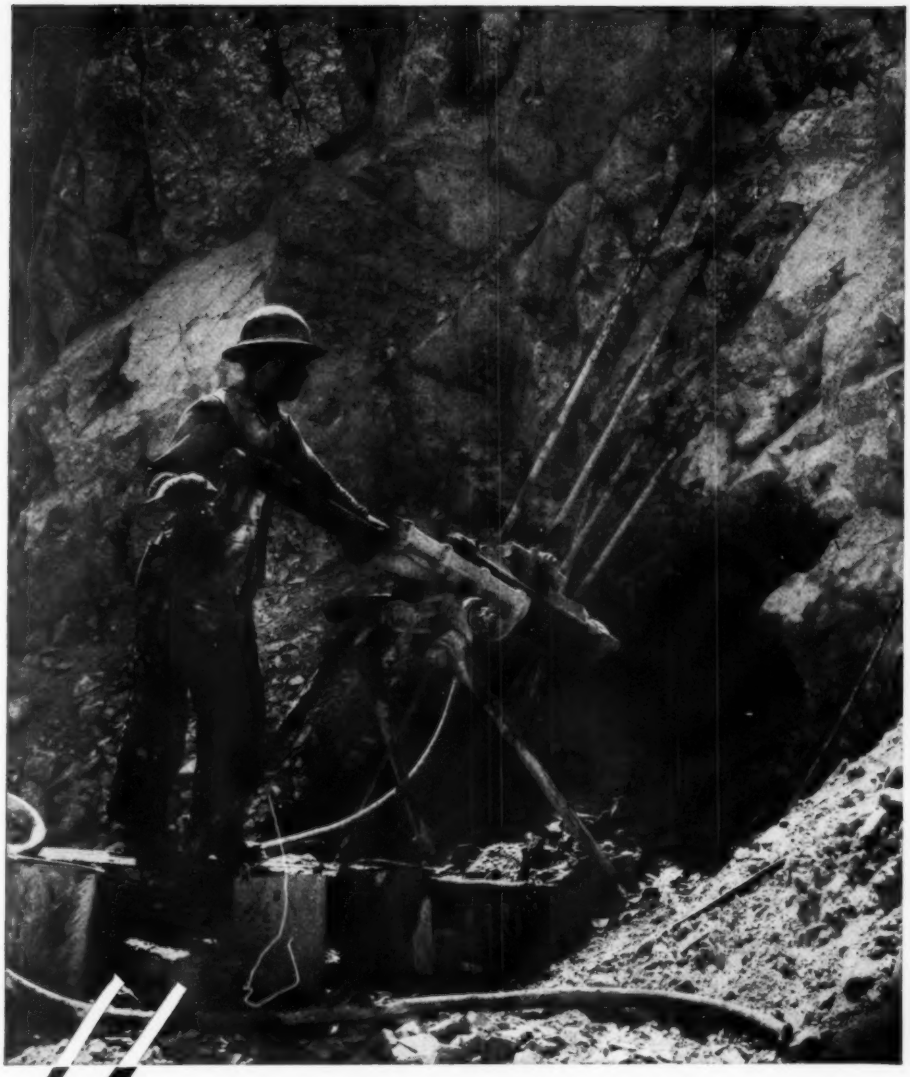
3. Connect main line lengths with square knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines *at right angles*. Avoid kinks and small loops.



Yes, for small holes, too

Primacord will save you money. This lightweight, waterproof, flexible detonating fuse acts as the detonating agent for each cartridge in the drill hole, and connects all holes. One fuse and cap or electric blasting cap attached to the end of the main line detonates the entire blast. Because of the special construction of Primacord, it is possible to detonate holes placed at very close intervals, without danger of cut-offs. Write for the Primacord book.

PRIMACORD BICKFORD
Detonating Fuse

PB-30

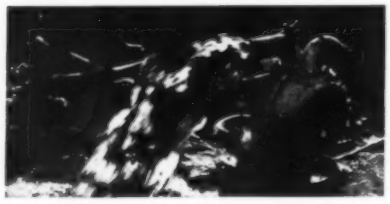
THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

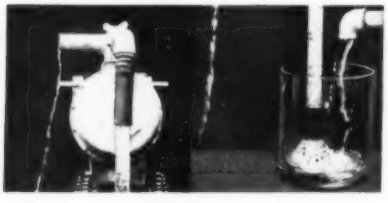
For your convenience in writing to The Ensign-Bickford Co., you will find a card bound in this issue.

When the Job's ALL WET use a Homelite Portable Pump

EASY TO GET AROUND—You can cover a lot of ground with a Homelite. And you can do a lot of pumping *quickly* and *easily* with it. It weighs only 91 pounds—complete with a built-in gasoline engine that runs it. You can set it up any place without trouble. Or you can move it around from spot to spot. It eliminates delays in pumping. Gets the pit dry on short notice.



QUICK TO DRY IT OUT—With a capacity of 15,000 gallons per hour, a Homelite is no slow-poke on the pumping. It gushes water out—dries any trench or excavation fast. Moreover it has a suction lift of 28 feet and handles sandy or muddy water without clogging—as much as 35% solids without trouble.



EXCELLENT ON SEEPAGE—With the fastest automatic self-priming you can find on any portable pump a Homelite is not only quick in getting into action but sure to keep seepage under control—No matter how much seepage you have, a Homelite automatically holds it constantly at strainer level.

Send for our latest pump bulletin.

HOMELITE CORPORATION

2203 Riverdale Ave. Port Chester, N. Y.

• Newly elected officials of the Illinois Road Builders Association pose with their retiring president during the association's fourth annual meeting in Chicago. L to R, standing: Donald O. White, White Consolidated Inc., treasurer; James F. Gallagher, Gallagher Asphalt Company, secretary; Taylor G. Soper, executive secretary; and Otto A. Milburn, Rockford Construction Company, president. Seated: Henry Fowler, John A. McGarry & Company, vice president; and Herbert R. Anderson, Robert R. Anderson Company, retiring president.

with road problems the past decade" was made January 15, 1941 by Otto A. Milburn of Rockford, newly-elected president of the Illinois Road Builders Association.

Addressing the banquet session of the fourth annual meeting of the contractor and equipment manufacturing group, Milburn forecast that "Mr. Average Motorist may be crowded off our roads during 1941 by military and defense-inspired industrial traffic."

The federal government has been "equally at fault in wasting vital years during which the motorist paid sufficient taxes to have built roads at least

A Haiss Bucket is a Crane Man's Delight

Power to grab and "rassel" a boulder out of sticky clay.... Power to dig in any ground.... Power in its closing gear, power in its jaws and teeth, power in its Haiss-design. Write or wire for prices. All sizes.

HAISS Hi-Power

FOR PAY LOAD CLAMSHELL DIGGING

In stock at New York, Philadelphia, Baltimore, Birmingham, Atlanta, Hartford, Harrisburg and Los Angeles

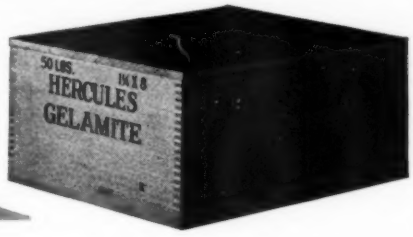
GEORGE HAISS MFG. CO. INC., 144th ST. & PARK AVE., NEW YORK — DISTRIBUTORS EVERYWHERE

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

GELAMITE

REG. U. S. PAT. OFF.

IN THE SPOTLIGHT



Eleven years ago a new type of explosive made its debut. It was the original semi-gelatin, named Gelamite (U. S. Patent No. 1,894,144). For eleven years, we've told you about the research behind it, the money it saves, its water resistance and fumes. It has earned a place in the spotlight.

as the BIGGEST SELLING HERCULES EXPLOSIVE

as the STANDARD explosive for tunneling

as the STANDARD explosive for metal mining

as a FORERUNNER in the trend to more economical explosives

EXPLOSIVES DEPARTMENT

HERCULES POWDER COMPANY

Incorporated

WILMINGTON • DELAWARE

A-81

For your convenience in writing to Hercules Powder Company, you will find a card bound in this issue.

equal to normal, peace-time demands; roads which now would be invaluable in avoiding the road jam which threatens," he declared.

Forecasting an increase in highway use during 1941 of up to 20 per cent over 1940's record-setting figure, the road builder pointed to Illinois' Highway 66 as a "glaring example of what the industrial, the military, or the usual motorist is facing."

He likened the highway situation to what would happen if you tried to fit a 10-ton truck into the ordinary one-car garage, declaring that "each year the Chicago and Illinois road systems have a decreased effective mileage because obsolescence is running far ahead of reconstruction while each year highway usage booms."

Milburn noted "with deep interest" and praised Gov. Dwight Green's statement in his inaugural address that his administration plans to rebuild Illinois roads.

"Aside from the greatly-increased military traffic, we are in the middle of a defense-inspired industrial and general business boom which will make past highway requirements seem insignificant. For the driver, such a boom is just going to increase his annoyance with traffic hazards. Undoubtedly it will see a mounting toll of traffic fatalities.

"The 1941 driver actually has less than half the road space he had a decade ago. The way things are going he may soon have only one-third the road space he had in 1930.

"Gasoline consumption had doubled in the last 10 years. Average automobile use in Illinois has jumped from 550 gallons per car in 1930 to approximately 750 gallons in 1940. In addition, modern cars go more miles per gallon.

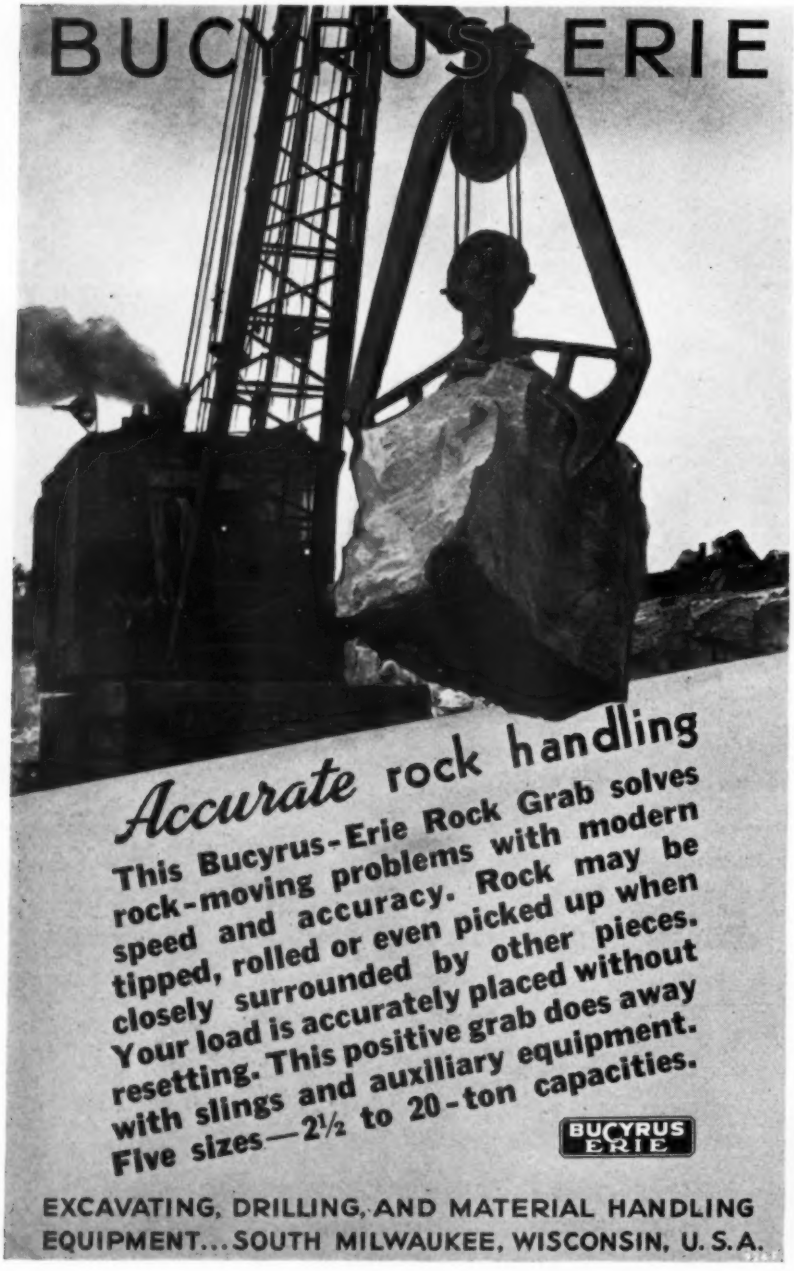
"The number of automobiles in use has increased by close to 19 per cent in a decade, approximately 33,000,000 cars and trucks being registered nationally. Illinois is running close to the two million mark in such registrations.

"Taxes accruing to federal, state and local governments from motor vehicle ownership and use increased to a new annual record of $1,850,000,000 in 1940.

"Yet, with all these increases in highway usage—under normal post-depression conditions—and higher tax revenues, the total annual appropriations for all highway purposes have decreased slightly since 1930.

"Travel on Illinois highways increased from 991,000 to 1,456,000,000 miles monthly during the 1930-1940 decade, operating on a state highway system of 13,610 miles. Gasoline consumption in the state increased about 7 per cent during 1940. A record high of $67,025,000 in motor taxes was paid in Illinois during 1940, compared with $45,916,660 paid to the state in 1930."

Mr. Milburn of the Rockford Construction Company, succeeds Herbert


BUCYRUS-ERIE
Accurate rock handling
This Bucyrus-Erie Rock Grab solves rock-moving problems with modern speed and accuracy. Rock may be tipped, rolled or even picked up when closely surrounded by other pieces. Your load is accurately placed without resetting. This positive grab does away with slings and auxiliary equipment. Five sizes—2½ to 20-ton capacities.
BUCYRUS ERIE
EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Increase your Manpower with no increase in payroll

Twenty men can lift 5 tons—one man can do the same with a Simplex No. 522 Emergency Jack. You'll pay out many times its small cost if you don't have one on hand to do the innumerable pushing, lifting, lowering and supporting jobs that come up daily on every construction job.

The No. 522 lifts a full 5-tons on cap, toe, auxiliary cap shoe or on the hooked chain. Tilts on base for angle jacking. Double socket for close-quarter jacking. As tough as they are handy. No. 310-A lifts 15 tons; No. 2030, 20 tons. Catalog 40 shows dozens of construction jacks.

Templeton, Kenly & Co., Chicago

Better, Safer Construction Jacks Since 1899

Simplex Jacks

dependable and efficient

Lever Type for toe and cap lifting.

Hydraulic for easier cap lifting.

Screw Jacks for economy.

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

5 NEW INTERNATIONAL Industrial WHEEL Tractors

• HERE ARE International Harvester's five *brand-new* International Industrial WHEEL Tractors. These "I" Tractors, added to the line of International TracTracTors and Power Units announced in 1940, make *standardization* on International Industrial Power *more profitable than ever.*

Three of these new "I" models have carburetor-type engines—two have quick, easy-starting, *full* Diesel engines. They are streamlined, efficient, economical—ready to cut costs to the bone on a wide variety of jobs.

Contractors, counties and townships, cities and villages, airports, parks, cemeteries, golf courses, railroads, public utilities, factories, lumber and building supply yards, etc., will find these new Internationals useful and economical on a wide variety of construction, maintenance, materials-handling, and transportation work.

All of these tractors have Tocco-hardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 15 m.p.h., gear drive, countershaft brakes that can be individually controlled or interlocked, provision for mounting a variety of allied equipment, and many other features.

See these tractors at first hand. Ask the nearest International Industrial Power dealer or Company-owned branch for full details.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois

Equipment the "I" Tractors Will Handle in the Construction Field:

Maintainers and graders; front-end shovels and loaders; cross-walk, side-walk, and other types of snow plows; road rollers; cranes and hoists; winches; brushes and sweepers; disk harrows and mixers for mixed-in-place roads; scrapers; dump wagons; trailers; tampers; mowers; etc.

"I" Tractor Facts

I-4—4-cylinder valve-in-head gasoline engine. Bore and stroke 3⅜ x 4¼ in. 5 forward speeds up to 15 m.p.h. Develops 29.5 engine h.p. at 1,650 r.p.m.

I-6—4-cylinder, valve-in-head gasoline engine. Bore and stroke 3⅞ x 5¼ in. 5 forward speeds up to 14 m.p.h. Develops 40.5 engine h.p. at 1,450 r.p.m.

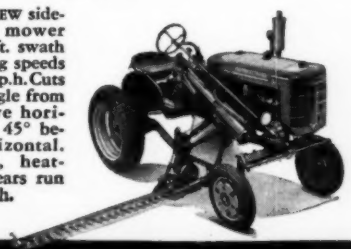
ID-6 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke 3⅞ x 5¼ in. 5 forward speeds up to 14 m.p.h. Develops 38.5 engine h.p. at 1,450 r.p.m.

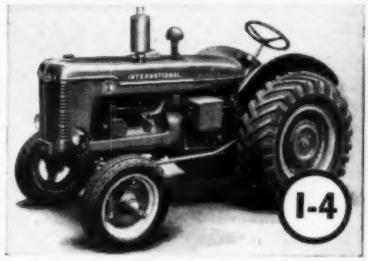
I-9—4-cylinder, valve-in-head gasoline engine. Bore and stroke 4.4 x 5.5 in. 5 forward speeds up to 15 m.p.h. Develops 54 engine h.p. at 1,500 r.p.m.

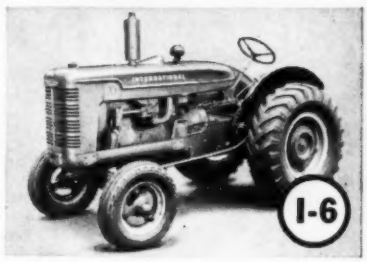
ID-9 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke 4.4 x 5.5 in. 5 forward speeds up to 15 m.p.h. Develops 51.5 engine h.p. at 1,500 r.p.m.

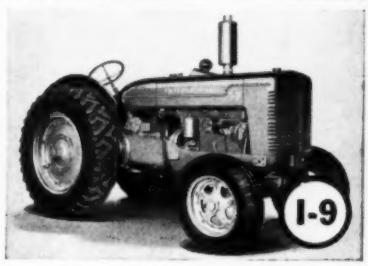
...and in the New INTERNATIONAL-A HIGHWAY MOWER

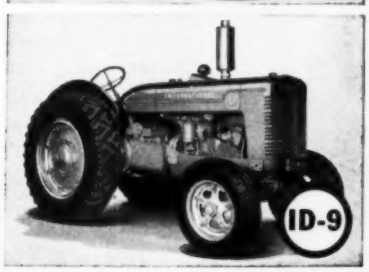
• THIS NEW side-mounted mower cuts a 5-ft. swath at mowing speeds up to 6 m.p.h. Cuts at any angle from 90° above horizontal to 45° below horizontal. Enclosed, heat-treated gears run in oil bath.











INTERNATIONAL Industrial Power

R. Anderson of Chicago, who helped organize the Illinois Association and has been its president for three terms.

Divide $40,000,000 Airport Program

In connection with the recent announcement of the locations of 200 airport sites which are to be constructed or improved under a $40,000,000 airport program, Col. Donald H. Connolly, administrator of civil aeronautics, has just made public the methods under which the appropriation will be expended.

In order to obtain the greatest possible number of completed and useful airports that the funds would permit, a plan which supplements the C. A. A. program with the work and funds of other federal agencies has been worked out:

This plan divides the work into three categories, as follows: 1. In cooperation with W. P. A., C. A. A. funds will be augmented by relief labor and with funds relating to that labor, at 88 points where the W. P. A. is already engaged in work projects; 2. By private contract, utilizing personnel of the Army Corps of Engineers for the work of engineering and supervision on 98 of the 200 sites; and 3. By Private contracts, all engineering work to be done by the Airways Engineering Division of the Civil Aeronautics Administration. This involves 14 sites, seven of which are located in the Territory of Alaska, and the remaining seven at various points within the continental limits of the United States.

All projects, with the exception of those to be completed by the W. P. A. will be contracted for by the Civil Aeronautics Administration and in all contract work, information as to the date and place that bids will be advertised can be obtained from the appropriate C. A. A. regional manager, as follows:

Region 1—John E. Sommers, La-Guardia Airport, New York, New York; Region 2—R. C. Copeland, Post Office Building, Atlanta, Georgia; Region 3—Harold R. Neely, 1204 Post Office Building, Chicago, Illinois; Region 4—L. C. Elliott, P. O. Box 1689, Fort Worth, Texas; Region 5—Leonard W. Jurden, City Hall Building, Kansas City, Missouri; Region 6—J. S. Marriott, 1508 - 4th Street, Santa Monica, California; and Region 7—R. D. Bedinger, King County Airport, Seattle, Washington.

Whitney Dam Near Completion

Work is nearly completed on Whitney Dam, one of the largest earthen flood control projects in the country. The structure, a mile in length and 90 feet high, stretches across the Otselic River at Whitney Point, 20 miles north of Binghamton, New York. It will protect the three cities of Binghamton, Johnson City and Endicott as well as the village of Whitney Point, which is just south of the dam and was badly battered with other southern New York state communities by disastrous floods in 1935 and 1936.

The project is the first of a series of five earth floodwater reservoirs. Total cost of this completed unit will be approximately $4,435,000, according to estimates of the New York State Flood Control Commission.

Two years were spent in surveying and work was begun in October, 1938, with power shovels attacking the river channel near the confluence of the Otselic and Tioughnioga rivers. These rivers both feed the Chenango river, which joins the Susquehanna at Binghamton. This spring, Army engineers will divert the flow of the Otselic to the east, where it will be harnessed as the stream pours through a 1,300-ft. tunnel, 85 feet underground, before it joins the Tioughnioga. Engineers believe that the reservoir formed by the Whitney Point dam will be filled on an average only once in 100 years. Water reaching the crest of the dam will be carried off by a huge spillway at present being constructed over the tunnel. Both spillway and tunnel empty into a central stilling basin on the downstream side of the structure, where the force of the water will be dissipated. Water flowing down the Otselic into the Chenango and

Drilling and Fishing Tools

By

BUCYRUS ERIE

Your drill is no better than its weakest part. For the best results you need time tested, dependable tools that ask no favors; tools that are designed to do a job effectively and made of steels that give long service. Bucyrus-Erie tools have proved through years of service that they meet these requirements. Send for Tool Catalog and Price List today. And the next time you need drilling and fishing tools — try Bucyrus-Erie Service. Stocks are kept at convenient warehouses in South Milwaukee, Wis.; Evansville, Ind.; Englewood, N. J.; and Waterloo, Iowa, for your convenience.

BUCYRUS-ERIE

SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Excavating, Drilling, and Material Handling Equipment

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

thence into the Susquehanna will be controlled by gates in the tunnel.

The additional reservoirs on the headwaters of streams in Delaware and possibly Otsego county comprise one of the largest control programs in the East. Present plans call for the expenditure of approximately $8,000,000, but supplemental work is likely to boost this figure.

Another Section of Contra Costa Let

Construction of an additional 8½-mile section of Contra Costa Canal to irrigate orchards and field crops in the vicinity of Concord and Walnut Creek was covered in a contract recently awarded.

Trewhitt-Shields & Fisher of Fresno, California, submitted the successful bid of $213,502, which was the lowest of eight proposals received and opened by the Bureau of Reclamation at its Sacramento, California office. Work specified in the contract must be completed in 450 days.

This 8½-mile section will bring the Contra Costa Canal to the crossing of Walnut Creek north of the town of that name. Heading at Rock Slough, near Knightsen, the canal will extend 46 miles to a terminal reservoir near Martinez. The first 29 miles of the canal have been completed as far as a point northeast of Concord. The new section will have a capacity diminishing along its length from 172 cubic feet per second to 125 cubic feet per second. The initial capacity of the canal at the head end is 350 second-feet.

The intensive cultivation of the area is indicated by the fact that the contract includes the construction of 27 farm bridges across the canal. Other structures on this section will include eight highway bridges and several canal siphons.

With the first 20 miles of the canal beginning operation in August, 1940, the first irrigation under the Central Valley project has been started from it for the benefit of several farms in the vicinity of Oakley. Other canal customers are the City of Pittsburg taking domestic water and the Columbia Steel Company using industrial water.

Bulldozers Help Repair an Aqueduct

By Floyd Suter Bixby

Thirty years ago Bill Mulholland and a hard working gang of men pushed 250 miles of pipeline across the desert to tap a vital source of water supply for Los Angeles. It wasn't an easy job. Half of the professional engineering world said it couldn't be done. But Bill finished the job in spite of desert, mountains, heat, and places so inaccessible that he had to hitch 52 mules to one pipe joint to roll it into line. So it must be a source of great satisfaction these days for the shades of William Mulholland to realize that his job is still something to be proud of.

For the J. F. Shea Company of Los Angeles is repairing a few of the siphons on Bill's pipeline. They've got a half million dollar contract with the Los Angeles Bureau of Water Works and Supply, let in March, 1940. And they're running into the same general problems that Bill did, only they've got a few machines to help them out.

Were it not for modern tractors with bullgraders, for huge trucks and trailers to take the place of Bill's mules, and for the modern arc welding process, the Shea Company would be having as hard a time of it as Bill did. Now they can weld a joint in the field much easier than Bill could rivet one. They can haul a 7½ ton section of pipe 29 feet long and 10 feet in diameter a whole lot easier with their trailers than Bill could with his mules. And not a small part of the story is the fact that the Shea Company has a few bullgrader-equipped tractors that hadn't been designed 30 years ago.

The Shea Company uses an International TD-18 tractor equipped with a Bucyrus-Erie bullgrader to do the odd jobs necessary in getting the sections of the pipe on the job. The machine builds roads for the huge trucks to travel over, and sometimes helps several D-8 Caterpillars with their work of

(*Continued on page 186*)

Let...
"Hercules" (RED STRAND) Wire Rope
Help You
Speed Up Production

"HERCULES" (Red-Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions — Standard or Preformed type.

TO maintain vital production schedules, it is highly important to use the kind of equipment that will give long and trouble-free service . . . consistently.

When it comes to wire rope, you can depend on "HERCULES" (Red-Strand). Proof of this is the fact that for over a period of 55 years it has been demonstrating its ability to meet the requirements of peacetime progress, as well as the demands of great emergencies. It has been able to do so because of the sound fundamental principles that have always governed its manufacture.

And this, too, is important. The same qualities and principles that make "HERCULES" (Red-Strand) Wire Rope so long lasting . . . so dependable, also make for greater economy.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street
SAN FRANCISCO • • 320 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

For your convenience in writing to A. Leschen & Sons Co., you will find a card bound in this issue.

NOT in the *Contract*

"Do you know what the ram said after he fell over the cliff?"

"No, what?"

"I didn't see that ewe turn."

The officer of the day stopped a mess orderly as he was carrying a soup kettle out of the kitchen.

"Here, you," he snapped, "give me a taste of that!"

Obediently he was handed a ladle, and he tasted it.

"Great Scott! do you call that stuff soup?" he roared.

"No, sir," responded the orderly meekly, "That's dish water."

Queen Elizabeth, the virgin queen, was very successful as a queen, according to our pal the absent-minded history professor.

Middle age is that period in a man's life when he'd rather not have a good time than have to get over it.

Early to bed,
Early to rise,
Watch your gal step out
With some livelier guys.

And then there is the yarn about the fellow who called up a theatre and ordered "a box for five."

"We haven't any," the man answered, "and besides you're nuts." Eventually the poor fellow discovered he had been connected with an undertaking parlor!

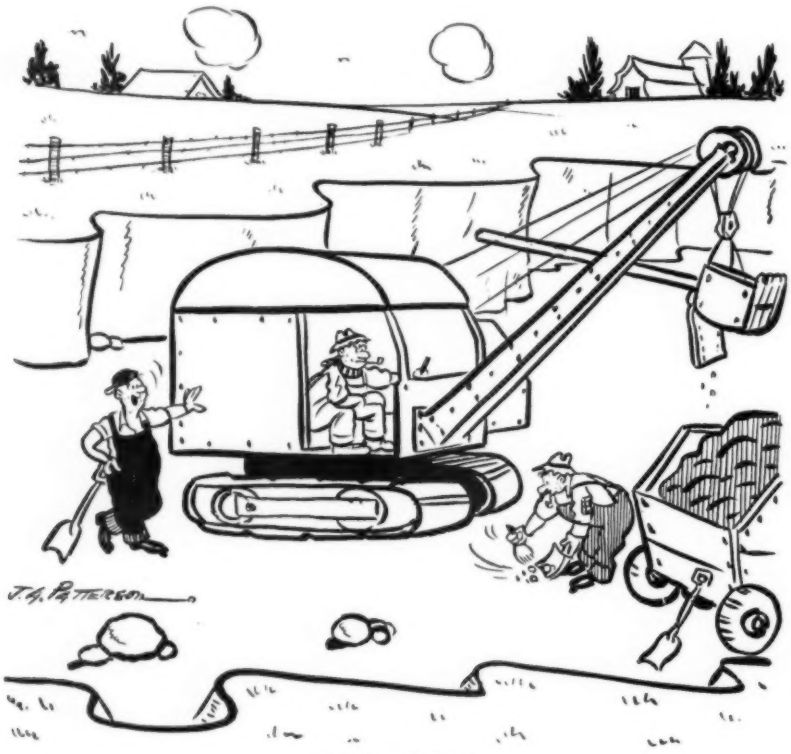
"I'm over my eyes in trouble," moaned the unhappy shovelrunner.

"What's the matter?" asked his boss.

"Just got a letter telling me to stay away from this guy's daughter or I'll be shot."

"Then stay away from her and everything will be jake."

"Sure—only he didn't sign his name."



"Neat, isn't he?"

I'm Tellin' You!

The following lines are explained in this International News Service item:

"Dam phones toot instead of ring at Grand Coulee. Whistles which can be heard for miles around, call men to the 225 telephones placed at various points on the dam. There is a particular pattern for each man called, it repeats until the telephone is answered."

The dam phones toot
So much at Gran' Coulee!
What makes 'em do 't?
I dunno truly.
Maybe for fun,
Maybe for reason,
For a son-of-a-gun
To ask were treason
Would I were a deaf mute or
Just a damphooly
Whom no phones need toot for
All day at Gran' Coulee!
Thass-all, Thanky.

R. M.

Teacher: Now, children, a collision is two things coming together unexpectedly. Andy, give me an example.

Andy (shyly): Twins?

Drunk: Shay, where does Gus Mulrooney live?

Friend: Why, you're Gus Mulrooney, old man.

Drunk: Shure, but where does he live?

She: Do you think I show distinction in my clothes?

He: Well, I wouldn't say distinction. I think distinctly would be a better word.

"Porter, get me another glass of ice water."

"Sorry, suh, but if I takes any mo' ice, dat co'pse in de baggage car ain't goin' to keep."

One of the deputies in the (former) French parliament was urging an improvement in the legal status of women. He said: "There is very little difference between men and women."

With one accord the entire chamber of Deputies rose and shouted: "Vive la difference!"

Extra EARTH-MOVING CAPACITY

CAPACITY TO CUT AND ROLL DIRT FASTER, EASIER, CHEAPER ... FREEDOM FROM WINDROW HANG-UPS

Here is a NEW motor grader—built the way you want it—with more time-saving, money-saving, profit producing features than you ever thought possible. It's more powerful, more versatile, stronger, faster ... easiest handling machine you've ever seen!

EXTRA AXLE CLEARANCE—A full six inches of *extra* clearance under the front axle enables you to handle windrows twice as large as ever before—to straddle heaping windrows without hanging up ... without wasting power ... without wasting fuel ... without decreasing travel speeds.

EXTRA THROAT CLEARANCE—Plenty of clearance between blade and circle adds extra earth-moving capacity. Heaping loads roll off blade freely without jamming up in the circle—no bulldozing action ... no power lost ... no frequent blade adjustments.

EXTRA POWER—Powered by a smooth 75 h. p. 2-cycle Diesel with a world of power to handle your jobs faster than ever before. It's *smooth* power that cuts your fuel bill—that eliminates costly vibration—that digs in and hangs on when the blade bites deep. It's the kind of power you've always wanted—simple, sturdy, smooth and thrifty.

FULL BLADE RANGE—Put it on your toughest job. Handles high bank cuts ... hard ditch cuts ... heavy oil mixing—all with equal ease. Operates forward or reverse. Blade positions and adjustments made quickly, easily, accurately.

WIDE SPEED RANGE—Operate at the exact speed desired for construction, maintaining, snow removal or travel. In addition to transmission speed changes, throttle engine control gives you a still greater selection of practical working speeds from 1.5 to 16.6 m.p.h. Get your jobs done on *time* and at a *profit*.

Before you buy any motor grader get the facts on this remarkable new machine. Find out *how* it will cut your costs—*why* you cannot afford to operate without one. See your Allis-Chalmers dealer ... NOW!

ALLIS-CHALMERS

TRACTOR DIVISION—MILWAUKEE, U.S.A.

POWER IT DOESN'T COST.. *it Pays!*

For your convenience in writing to Allis-Chalmers, you will find a card bound in this issue.

Photo by Courtesy of the Sterling Motor Truck Co.

A COMPARATIVE JOY RIDE

THE Harrison Construction Co. of Pittsburgh finds the speedy movement of this monster Lorain shovel on their Trailer a joy ride in comparison with older methods or less advanced equipment.

ROGERS' TRAILER

This completely electrically welded trailer is thoroughly engineered to withstand every possible strain including terrific overhanging loads like this one.

Four rear axles oscillate longitudinally and transversely to distribute the load over sixteen tires and Patented equalizing brakes afford safety of control under all conditions.

There is a Rogers trailer for every requirement.

ROGERS BROTHERS CORPORATION
136 *Orchard St.* Albion, Penna.

EXPERIENCE *builds them* PERFORMANCE *sells them*

Shots . . .

(*Continued from page 183*)

pulling the trucks through the soft places. The old sections of pipe are cut in half and pushed aside by the 'dozer to be picked up later for scrap.

The same factors which made Old Bill hand pick his men and mules still make that desert country a bad place for machinery that's apt to break down. It's a long way to the city, and machinery just simply has to stand up, for breakdowns tie up an operation involving many units. Thus far everything has gone along in fine shape.

The old concrete cradle type piers are still standing intact after more than a quarter of a century. About all that's necessary for the Shea Company to do is simply to set the pipe sections in place with either a Bucyrus-Erie crane or a Northwest 80D machine. Electric arc welding and inside treatment with waterproof enamel will reduce the line friction loss in the new pipe.

Still in the offing are two difficult pieces of excavation; 21,000 cubic yards at Deadman Siphon and 38,000 cubic yards at Soledad Siphon. The terrain is mountainous and rocky. It will be a good chance for the bullgraders to show Old Bill, wherever he is, what a modern machine can do in the way of gouging out cuts. For the bullgrader, with a curved blade which rolls the dirt, is acknowledged now to be the cheapest and most effective way of moving material a short distance.

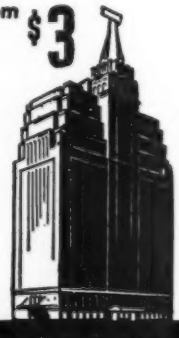
Making up the work items are the following sections of the line which are being replaced: 697 feet on the San Antonio Canyon Siphon, 1,724 feet on Jawbone Canyon Siphon, 2,123 feet on Deadman Canyon Siphon, 1,049 feet on the Dove Springs Siphon in Red Rock Canyon, and 3,128 feet on the Soledad Canyon Siphon.

Finest Subway Entrance to all Points of Interest

New York's Popular
HOTEL
LINCOLN
44TH TO 45TH STS. AT 8TH AVE.

OUR CHOICEST ROOMS From $3
1400 ROOMS each with Bath, Servidor, and Radio.
* Four fine restaurants awarded Grand Prix 1940 Culinary Art Exhibition.

MARIA KRAMER
PRESIDENT
John L. Horgan
Gen. Mgr.
HOTEL EDISON
SAME OWNERSHIP



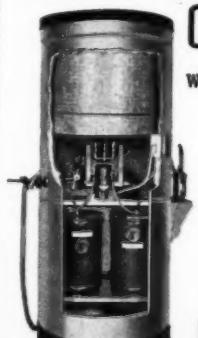
IN THE CENTER OF MID-TOWN NEW YORK

HAYWARD BUCKETS

PLAY SAFE . . .
CHOOSE HAYWARDS

Hayward Buckets won't fall down on the job, cause time out, or require costly repairs.

THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.



Oil Users - Savings Plus
with the new Bucyrus-Erie Oil Reclaimer

1—Filters lubricating oil of any quality or grade from either gasoline or diesel engines.

2—Returns up to 90% of your used crankcase oil ready for re-use.

3—Saves from 60 to 80% on your oil cost.

Write today for complete story.

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WIS., U. S. A.

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

Where to Buy BUCYRUS ERIE and BUCYRUS MONIGHAN Products

For Shovels, Draglines, Cranes, Clamshells, Skimmers, and Dragshovels 'Phone or Write the Nearest Dealer or Branch Office Listed Below.

For Large Shovels and Draglines, Walking Draglines, Bucyrus-Ruth Excavators, Blast-Hole, Prospecting, Oil Well, and Water Well Drills, 'Phone or Write the Nearest Bucyrus-Erie Branch Office Indicated Below with an *

ALASKA: (See Washington, Seattle).

ARIZONA, PHOENIX: O. S. Stapley Co.

ARKANSAS, LITTLE ROCK: Lyons Machinery Company.

CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue, Phone Kimball 5137.
*SAN FRANCISCO: Bucyrus-Erie Company, 390 Bayshore Blvd. Phone Atwater 2341.

COLORADO, DENVER: Ray Corson Machinery Co., 1646 Waxee Street.

CONNECTICUT, NEW HAVEN: The W. I. Clark Co., 1811 Dixwell Ave.

FLORIDA, JACKSONVILLE: Quinn R. Barton, Inc., 1305 W. Forsyth St.

GEORGIA, ATLANTA: Bucyrus-Erie Co., 1508 William-Oliver Bldg. Phone Jackson 1545.
ATLANTA: R. S. Armstrong & Bro. Co., 676 Marietta. Phone Jackson 2010.

IDAHO, BOISE: The Intermountain Equipment Co., Broadway at Myrtle St. Phone 171.

*ILLINOIS, CHICAGO: Bucyrus-Erie Company, 1312 Bankers Bldg., 105 W. Adams Street. Phone Franklin 5321.
CHICAGO: Great Lakes Supply Corp., 824 W. 36th St.

INDIANA, INDIANAPOLIS: A. F. Deancy, 719-721 N. Pine St.

IOWA, CEDAR RAPIDS: James W. Bell, 916—16th N. E.
DAVENPORT: Harry Alter & Sons, 514 S. Howell St.

KANSAS, PITTSBURG: Bucyrus-Erie Co., 209 East 4th St. Phone 164.

KENTUCKY, LOUISVILLE: Brandeis Machinery & Supply Co., Brook & Warnock Sts. Phone Magnolia 6600.

LOUISIANA, NEW ORLEANS: Wm. F. Surgi, 101 Magazine St.

MAINE, PORTLAND: Maine Truck-Tractor Co., 158 Veranda St.

MARYLAND, BALTIMORE: Stuart M. Christhilf & Co., 205 Snow Bldg. Phone Calvert 4310.

*MASSACHUSETTS, BOSTON: Bucyrus-Erie Company, 240 N. Beacon St. Phone Stadium 3152.

MICHIGAN, DETROIT: E. D. Coogan, 10410 E. Jefferson Ave.

MINNESOTA, CROOKSTON: Wm. H. Ziegler Co., Inc., 1115 So. Main St.
DULUTH: Wm. H. Ziegler Co., Inc., 304 Lake Ave., So. Phone Melrose 681.
MINNEAPOLIS: Wm. H. Ziegler Co., Inc., 2331 University Ave., S. E. Phone Gladstone 7971.

MISSISSIPPI, JACKSON: Mississippi Road Supply Co., Telephones: Long Distance 9906. Local 3676.

*MISSOURI, KANSAS CITY: Bucyrus-Erie Company, 1007 Fairfax Bldg. Phone Harrison 4811.
*ST. LOUIS: Bucyrus-Erie Company, 818 Olive St.—Suite 906. Telephone Chestnut 1354.
ST. LOUIS: Ryan Equipment Corp.

MONTANA, MISSOULA: Westmont Tractor & Equip. Co.

NEBRASKA, OMAHA: Cardinal Supply & Mfg. Co., Sunderland Bldg.
OMAHA: Fuchs Mchy. & Supply Co., 1102 Farnam Street.

*NEW JERSEY, ENGLEWOOD: Bucyrus-Erie Company, 214-216 South Dean Street. Phone 3-6727.

NEW MEXICO, ALBUQUERQUE: R. L. Harrison Co., Inc., 209 N. 4th Street.

*NEW YORK, NEW YORK: Bucyrus-Erie Company, 30 Rockefeller Plaza, Suite 5050. Phone Columbus 5-4395.
ALBANY: Contractors Sales Co., Inc., P. O. Box 949.
MINEOLA: H. O. Penn Machy. Co.
NEW YORK: H. O. Penn Mchy. Co., Inc., 140th St. and East River.
POUGHKEEPSIE: H. O. Penn Machy. Co.
*SYRACUSE: Bucyrus-Erie Company, 303 Draper Ave. Phone 6-1078.

NORTH CAROLINA, GREENSBORO: E. F. Craven Company.

OHIO, CINCINNATI: Bode-Finn Co., 1654 Central Avenue.
CLEVELAND: W. T. Walsh Equipment Co., 3088 W. 106th St.
COLUMBUS: H. S. Robertson, Walhalla Rd. Phone Jefferson 3242.
ZANESVILLE: Southern Ohio Equip. Co., 941-3 W. Main St.

OKLAHOMA, GUTHRIE: Clarence L. Boyd Co., Inc., 501 West Oklahoma.
OKLAHOMA CITY: Clarence L. Boyd Co., Inc., 17 S.W. Pottawatomie St.

OREGON, PORTLAND: Clyde Equipment Co., 17th & Thurman Streets. Phone Broadway 5561.

*PENNSYLVANIA, PHILADELPHIA: Bucyrus-Erie Company, 821 Commercial Trust Bldg. Phone Rittenhouse 4281.
PHILADELPHIA: Furnival-Rimmer Co., Lancaster Ave. at 54th St. Phones: Trinity 5200 and West 1617.
BRADFORD: Beckwith Machy. Co., 361 Congress St.
HARRISBURG: Beckwith Machinery Co., 635 N. Cameron St. Phone 4-4064.
KINGSTON: Beckwith Machinery Co., 249 Market St.
*PITTSBURGH: Bucyrus-Erie Co., 1502 Clark Bldg. Phone Atlantic 4815.
PITTSBURGH: Beckwith Machinery Co., 6550 Hamilton Ave. Phone Montrose 4300.

TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd.
MEMPHIS: Road Builders Equipment Co., Third and Calhoun Sts.

TEXAS, DALLAS: E. B. Chambers, 1806 Tower Petroleum Bldg. Phone 2-2943.
ABILENE: R. B. George Machinery Co.
DALLAS: R. B. George Machinery Co., 1135 S. Lamar St.
EL PASO: Tri-State Equipment Co., 500 E. Overland Ave.
HOUSTON: Gulf Tractor & Equip. Co., 3100 Polk Ave.
PECOS: Tri-State Equipment Co.
SAN ANTONIO: Wm. K. Holt Machy. Co., West Harding Rd.
TYLER: R. B. George Machinery Co.

UTAH, SALT LAKE CITY: The Lang Co., 267 N. First St.

VERMONT, BARRE: Reynolds & Son, Inc.

VIRGINIA, RICHMOND: Virginia Tractor Co., Inc., 1628 W. Main St.

WASHINGTON, SEATTLE: Clyde Equipment Co., 3410 First Ave., South.
*SEATTLE: Bucyrus-Erie Co., 3408 First Ave., So. Phone Main 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg.
SPOKANE: Construction Equipment Co., 1118 Ide Ave.

WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave.

WISCONSIN, MILWAUKEE: W. L. Hartley, 2446 N. 62nd St., Wauwatosa, Wis.

Canada

BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equip. Co.

MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Ave.

ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building.

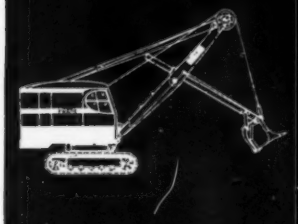
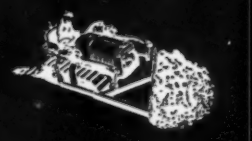
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.

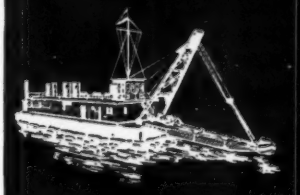
For Bucyrus-Erie Tractor Equipment — Bulldozers, Bullgraders, Hydraulic and Cable-Controlled Scrapers, Rippers, Tamping Rollers and Power Control Units See Your International Industrial Power Dealer

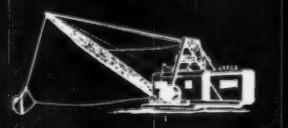
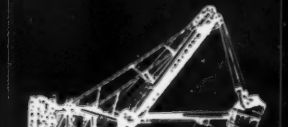
You can choose a modern Bucyrus-Erie and be sure of getting performance exactly suited to your needs. In 60 years Bucyrus-Erie has built over 30,000 machines for the excavating, drilling and material-handling field. With sales and service representation in all principal countries of the world, Bucyrus-Erie has a breadth of experience that is added assurance of the performance you want.

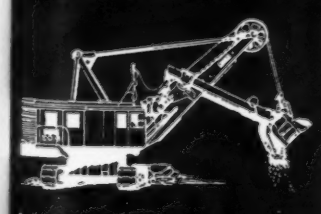
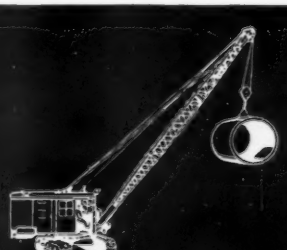
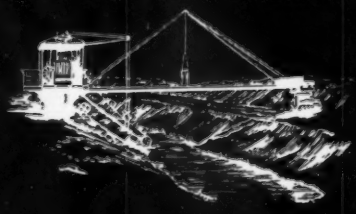
Bucyrus-Erie

GENERAL OFFICES: SOUTH MILWAUKEE WISCONSIN U. S. A.



Notes from the manufacturers

Worthington Pump and Machinery Corporation, Harrison, New Jersey, named Harry J. Schultz central regional manager of their construction equipment division with headquarters at Worthington's Chicago office at 400 West Madison Street.

Ransome Concrete Machinery Company, Dunellen, New Jersey, has appointed T. G. Abrams of Dearborn, Michigan, and the Anderson Equipment Company, Grand Rapids, Michigan, as new agents. They will handle the sale of Ransome pavers, mixers, truck mixers, agitators, etc. with the exception of 7-S mixers and smaller. The Michigan Equipment Company, Detroit, will handle these.

Hercules Motors Corporation, Canton, Ohio, have acquired the four-story factory building formerly occupied by the York Ice Machinery Corporation. In taking over the property the Hercules Company adds 164,000 square feet of factory floor space to its present facilities and approximately 7 acres of property to its present tract.

Caterpillar Tractor Company, Peoria, Illinois, announce several changes in their sales set-up. Henry M. Hale, eastern sales manager, resigned that position to enter into partnership with John R. Taylor to form the Taylor-Hale Machinery Company at Memphis, Tennessee. The company will handle "Caterpillar" sales and service in an extensive southern area. George Rinck, assistant eastern sales manager, advances to the position left vacant by Mr. Hale. Kenneth Cox will be the new assistant eastern sales manager.

The Timken Roller Bearing Company, Canton, Ohio, appointed M. C. Bellamy district manager of industrial bearing and steel sales for the Seattle territory. A graduate of Purdue University, Mr. Bellamy joined The Timken Roller Bearing Company in 1928. He served as sales engineer of their Seattle office since 1934.

John A. Roebling's Sons Company, Trenton, New Jersey, have appointed Percy Jenkins manager of their Boston branch. A graduate of Harvard University, he has been associated with the Wickwire Spencer Steel Company for the past fifteen years. His office will be located at 51 Sleeper Street.

Brooklyn Brick Company, Indianapolis, Indiana, have completed a new office on their factory grounds at Brooklyn, Indiana. The Indianapolis office has been closed, and on January 20, 1941, they moved to their new location.

The Asphalt Institute, 801 Second Avenew, New York, New York, has announced the appointment of W. R. Macatee to the newly created post of assistant managing director. He has been serving as district engineer with an office in the Transportation Building, Washington, D. C. He will continue in charge there.

Independent Pneumatic Tool Company, 600 West Jackson Blvd., Chicago, Illinois, will exhibit its complete line of Thor portable electric tools in space number 273 at the ASTE National Machine and Tool Progress Exhibition, March 25 to 29. Special features and demonstrations will form part of the display. In attendance at the Thor booth will be the company's service engineers who, by training and experience, are particularly qualified to advise and consult with production executives regarding power tool problems.

Friction Problems? SEE GATKE

Moulded Asbestos Brake Blocks

Moulded Swinging Friction.

Licking tough friction jobs is GATKE'S Business.

On-the-job information is furnished by GATKE Field Men and Customers from all over the world.

Tremendous Development Facilities *work* the year around *perfecting BETTER* and *BETTER* Materials.

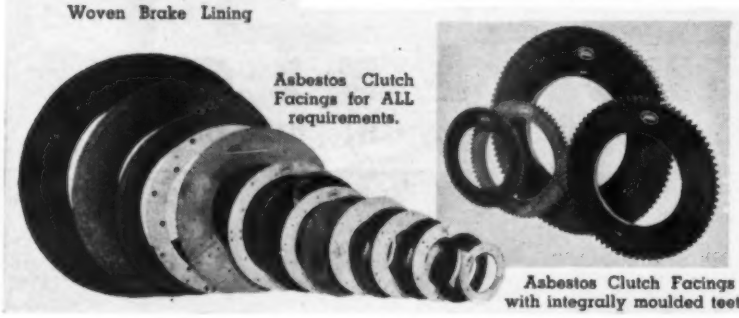
Whatever your service, *we have what it takes to* do the job BETTER and *will* guarantee results.

GATKE Moulded Fabric BEARINGS do the Impossible Write for Facts

Just *tell* us what you need.

Woven Brake Lining

GATKE CORPORATION
232 N. LaSalle St., Chicago



Asbestos Clutch Facings for ALL requirements.

Asbestos Clutch Facings with integrally moulded teeth.

For your convenience in writing to Gatke Corporation, Inc., you will find a card bound in this issue.

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

BLAST HOLE DRILL OPERATOR

Blast hole drill operator, 10 years' experience on gas, diesel and electric, large and small machines. Can do own repair work. Middle age, single and willing to go anywhere in U. S. A. Excellent references. Box 9160

EXPERIENCED OPERATOR

Operator with fifteen years' experience on gasoline and diesel powered shovels, draglines, and crane-clamshell machines on highway and sewer construction jobs desires steady work anywhere. Preference: Northwest shovel or dragline about 2 yard capacity. Can do own repair work. References furnished. Age 32. Married. Now located in Missouri. Box 9159

SUPT.-FOREMAN

With 20 years' experience of concrete work on all kinds of buildings, bridges, highway roads. Will go anywhere in United States. Best reference. Box 9165

BLAST HOLE DRILL OPERATOR

Three years' steady employment on Loomis Clipper "44," Cyclone piston type 1200-G and Bucyrus-Armstrong 27-T and 42-T, gas and electric blast hole drills on Penna. anthracite coal field. Able to make repairs. Unmarried. Age 39. Now located in Pennsylvania; willing to go anywhere. Can furnish best of references. Wants steady job on any blast hole drill: preference Armstrong. Box 9161

EXPERIENCED OPERATOR

Operator with 20 years' experience on steam, diesel and electric draglines and shovels. Prefers steady work in rock quarry, gravel pit or strip mine. Tools. Experienced on repairs. Married, sober, reliable. Best references. Box 9166

HELP WANTED

WANTED—Tractor Equipment salesman who understands application of scrapers, bullgraders, bulldozers, etc.; applicants with selling experience abroad or at least some knowledge of exporting will be given preference. Position to be filled in home office. Address application to Walter H. Porth, Bucyrus-Erie Company, South Milwaukee, Wisconsin.

New trade literature

Title: **"Compilation of Rental Rates for Construction Equipment"**

Subject: The result of several years endeavor to effect a rental schedule for construction machinery applicable to all sections of the United States. This compilation represents an average of rental rates throughout the country. A helpful guide to all engaged in the construction industry.

Where to Get: Rental Committee, Associated Equipment Distributors, 3343 Franklin Avenue, St. Louis, Missouri. Price, $1.00.

Title: **"The Operation and Maintenance of Rock Drills"**

Subject: A handy manual containing practical and valuable information and several drawings to help the miner and drill doctor overcome the every day problems arising in connection with the operation of a sinker, drifter or stoper.

Where to Get: Earl Drechsler, Sherridon, Manitoba, Canada. Price, $2.00. Special rates when purchased in lots of more than twenty-five and fifty.

Title: **"Portable Crushing and Screening Plants"**

Subject: New catalog illustrates and describes this modern, self-contained unit. The application and use of the rotor-lift is defined. Complete specifications also included.

Where to Get: Diamond Iron Works, Inc., and Mahr Mfg. Company Division, Minneapolis, Minnesota.

Title: **"MacQuown's Coal Directory and Buyer's Guide"**

Subject: Complete data on all coal selling and coal operating companies and their relationship. Complete informative list of sales agents, trade names, beehive and by-product coke. The standard edition offers many added features. Of helpful use to anyone interested in the production, sale, transportation or consumption of coal and coke.

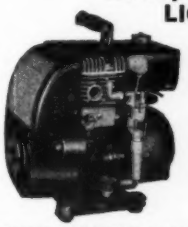
Where to Get: National Coal Publications, W. C. MacQuown, Owner, 304 Law Bulletin Building, Pittsburgh, Pennsylvania. Price (standard edition)—$15.00 a copy and (abridged edition)—$10.00 a copy.

Title: **"Pneumatic Tool Catalog"**

Subject: Striking in appearance, this new catalog is fully illustrated by tool and action pictures and gives complete specifications on the entire line of Thor pneumatic tools and accessories.

Where to Get: Independent Pneumatic Tool Company, 600 West Jackson Blvd., Chicago, Illinois. Free upon

ONAN ELECTRIC PLANTS
for Dependable LIGHT and POWER



Alternating or Direct Current
• •
Any Voltage
Any Frequency
• •
350 to 50,000 Watts

ONAN ELECTRIC PLANTS furnish Dependable Light and Power on Excavating and Construction Jobs for the operation of all Tools used on the Job—Drills, Saws, Grinders, Sanders, Compressors, Water Pumps, Tampers in addition to Plenty of Light for Night Work. Over 40 different Models of ONAN PLANTS are in daily use in Construction and Maintenance in Commercial and Government Building during present NATIONAL DEFENSE PROGRAM.

No Job is too large or too small for an ONAN ELECTRIC PLANT. Hand Portable Models from 350 through 1250 Watts—Dolly or Trailer Models from 350 through 5,000 Watts—Stationary Units through 50,000 Watts—Air or Water Cooled—Gasoline, Natural Gas, Oil or Diesel Powered Engines.

Heavy-Duty, Compact, they're shipped COMPLETE—READY TO GO ON THE JOB.

Write Today for Complete Details

D. W. ONAN & SONS
1189 Royalston Ave., Minneapolis, Minn.

AN OWEN GRAPPLE *will furnish* THE SOLUTION

SPECIAL jobs often require special tools and while rock handling problems are doubtless common to many, OWEN has perfected and proved the special tool for this job in the Type RA Rock Grapple. Revolutionary, independent tine action, enormous lifting capacity and other exclusive features distinguish it decidedly from other equipment intended for like use.

Write for the new catalog, just off the press.

The **OWEN BUCKET** *Co.*
6095 BREAKWATER AVE., CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

request, ask for No. 52 Pneumatic Tool catalog.

Title: **"P&H Model 955 Excavator"**
Subject: A thirty page booklet with descriptive and illustrative information about this new, large capacity machine.
Where to Get: Harnischfeger Corporation, Milwaukee, Wisconsin. Free upon request, ask for bulletin X-21-1.

Title: **"Highway Widening Machines"**
Subject: Four page bulletin briefly describing Buckeye Model 16-R-2 and Model 16-R-4 machines with operating views of these units and complete specifications.
Where to Get: The Buckeye Traction Ditcher Company, Findlay, Ohio. Free upon request.

Title: **"Size One Magnetic Motor Starter"**
Subject: An illustrative description of the new G-E full-voltage magnetic motor starter, D51, designed for machines. Forms, dimensions and ratings also included.
Where to Get: General Electric Company, Schenectady, New York. Free upon request, ask for form GEA-2964B.

Title: **"Concrete Culverts and Conduits"**
Subject: Particular attention is given in this booklet to the design requirements of the practical engineer. The fundamental theory is concisely treated, emphasis being directed to modern methods by which drainage structures are economically chosen, properly located and correctly designed. Profusely illustrated.
Where to Get: Portland Cement Association, 33 West Grand Avenue, Chicago, Illinois. Free upon request.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

BUCYRUS-ERIE 1035 Gas Combination Shovel and Clamshell. Clamshell boom 40'. Electric starter. Lighting equipment. Good operating condition. Located Kentucky. Box 2673

BUCYRUS-ERIE GA-2 High Lift 1 yd. Shovel and 45' Boom Crane. Waukesha WS engine. Single Shaft Cats. Operating condition. Located eastern Pennsylvania. Box 2566

LINK-BELT MODEL K-48 Gas Shovel. 1¾-yd. Esco dipper. Good operating condition. Located Montana. Box 2618

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6½"x8" 4-cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2559

KOEHRING MODEL 1-A. Combination 40' boom crane and dragline. Gasoline. Wisconsin engine. Operating condition. Located near St. Louis. Box 2714

KEYSTONE MODEL 4 — Gasoline dragshovel. Operating condition. Located western Pennsylvania. Box 2526

PILE DRIVING CRANE. 50' boom, large 54" boiler handles No. 7 M-T hammer. Also for sale, Fairlead and 30' boom Link-Belt K2. Location Chicago. Bargains. Box 2702

SPEEDER D-4 Diesel Shovel. Caterpillar D-7700 engine. Good operating condition. Located Idaho. Box 2675

AUSTIN MODEL "MA" Gasoline Dragline—37' Boom—¾ yd. Page "M" drag bucket. Good operating condition. Located western Nebraska. Box 2695

BUCYRUS-ERIE GA-3 Gas-Air 1¼-yd. shovel. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Now operating Arizona. Box 2701

BUCYRUS-ERIE GA-2 Gas-Air 1 yd. Shovel. Very good operating condition. Located North Carolina. Box 2708

NORTHWEST Model 18—½-yard shovel and trailer. Elec. starter, excellent condition. Located Skokie Highway, Highland Park, Ill.
MENONI & MOCOGNI

NORTHWEST 6—1½ yd. Shovel. Twin City Oil Engine. Field reconditioned. Excellent shape. Located San Francisco. Box 2717

UNIVERSAL ¼-yd. Gas Shovel. ¾ Swing. Bargain price. Located Indiana. Box 2691

OSGOOD COMMANDER II Combination ¾-yd. Shovel—Cable Crowd and 40' boom dragline including ¾-yd. drag bucket. Hercules engine. Good operating condition. Located California. Box 2690

BAY CITY WALKING type Dredge, 1¼-yard shovel. Excellent in swamp or low ground. Fairbanks-Morse oil engine Type HB. Good operating condition. Located Delaware. Box 2677

P&H MODEL 206 Gas Shovel. Substantially repaired. Good operating condition. Located Portland, Oregon. Box 2685

BUCYRUS-ERIE 50-B Diesel Dragline Kohler Light Plant. Worked less than half the time since sold new. Good condition. Located Illinois. Box 2699

If You Do Not Find What You Want Listed — Write Us
EXCAVATING engineer
South Milwaukee, Wis.

BUCYRUS-ERIE 30-B Diesel 50' boom Dragline. 1¼ yd. Page drag bucket. Good operating condition. Located Illinois. Box 2540

NORTHWEST NO. 2 Gas Combination ⅝ yard Shovel and 40' boom Clamshell and Dragline including Kiesler ⅝ yd. clamshell bucket. Wisconsin engine new in 1936. Excellent condition. Located Spokane, Washington. Box 2649

BUCYRUS-ERIE 1030 Gas Combination Shovel. Clamshell, and Drag Shovel with three dippers. Electric starter. Wisconsin engine. Recently thoroughly rebuilt. Located eastern New York State. Box 2653

LINK BELT, MODEL K-2, Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2681

LORAIN MODEL 87 2-cu. yd. Shovel. Caterpillar Diesel 17,000 engine. Kohler light plant. Excellent condition. Located near Pittsburgh, Pennsylvania. Box 2689

LORAIN 75-B Combination 1½ yd. Shovel and Dragline. Waukesha gasoline engine—just overhauled. Located Eastern Pennsylvania. Box 2686

NORTHWEST MODEL 85 Dragline. 80' Boom, 2-yd. Basket Type Drag Bucket. Light Plant. Twin City Oil Engine, 4 cylinder 8"x9". Only used 21 months. Located Louisiana. Box 2694

LIMA MODEL 901 Combination 2¼ yd. shovel and 70' boom dragline. No bucket. Hesselman 6 cylinder 7" x 7" engine. Good operating condition. Located Montana. Box 2687

BUCYRUS-ERIE GA-2 Gas-Air 1¼ yd. extra high lift shovel. Waukesha engine. Excellent condition. Located northwestern Pennsylvania. Box 2693

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

BUCYRUS-MONIGHAN Model 6160 — Diesel Dragline. 175' boom, 6 cu. yd. drag bucket. Operating condition. Located Montana. Box 2709

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas. Box 2678

BUCYRUS-MONIGHAN Model 3½-T—70' boom dragline. 2½-yard dragbucket. Fairbanks Morse Diesel engine. Located North Dakota. Box 2713

BUCYRUS-ERIE CLASS 230 Diesel Electric Dragline. 150' boom. 6-cu. yd. bucket. Light weight cats. Powered by two units each consisting of Atlas Diesel 6-cylinder 9"x10½" engine and 120 KW 250 volt direct current generator. Hoist motor 250 HP. Swing motor 75 HP. Can be bought at bargain. Located Florida. Box 2622

BUCYRUS-MONIGHAN 4-W Diesel Dragline. 110' Boom. 4½-yd. Bucket. Reported good working condition. Some extra parts included. Located Georgia. Box 2700

FOR SALE
6½-yd. Bucyrus 320-B
Electric Revolving Mining
or Stripping Shovel.
(A rare buy!)
Write for particulars.
IRON & STEEL PRODUCTS, INC.
36 Years' Experience
13474 So. Brainard Ave., Chicago, Illinois
"Anything containing IRON or STEEL"